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Editorial

It has been apparent for some time that *Accounting and Business Research* has been receiving more good articles than it has been able to publish within a reasonable period of the date of acceptance. The lists of Forthcoming Articles in recent issues bear eloquent witness to this. It is for this reason that we have occasionally published 96 page instead of 80 page issues. From this issue onwards we shall be publishing 96 pages every quarter and hope thereby to reduce substantially the backlog of accepted but unpublished articles.

Increasing the size of *Accounting and Business Research* has undoubted benefits but it also has costs. In order to keep these to a minimum we have reduced the size of the typeface and cut back on the generous margins. We still feel that the production standards of the journal are very high and are confident that readers will soon come to accept our new format.

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Profit-Sharing and the Finance Acts 1978 to 1983: A Case for a Review of Incentives

B. Breakwell

In the 1978 Finance Act, the then Labour Government made new tax concessions available for all employees whose employer companies were willing to introduce an 'approved' form of profit-sharing scheme. These concessions were made at least in part as a response to Liberal Party influence through the so-called 'Lib-Lab pact'.¹ Since that time the concessions have been extended by Conservative Governments in each of the 1980, 1982 and 1983 Finance Acts. We may therefore infer the support of Britain's major political parties for the style and type of these concessions, and conclude that they are likely to be with us for some time.

This paper examines the new 'approved' type of profit-sharing (the 'new schemes') and looks at currently available evidence in an attempt to assess the interest aroused in companies by such schemes, their reception by employees, and their likely effect upon overall personal sector shareholding as a proportion of total UK equity capital. The paper concludes by suggesting ways in which the present statutory provisions might be made more effective if, indeed, successive Governments take the view that such forms of employee participation offer benefits for the economy as a whole through enhanced worker co-operation and increased motivation.

Leaving aside a consideration of share incentive schemes designed for senior executives we can say that profit-sharing schemes such as we are here concerned with (involving the distribution of part of a company's profit amongst *all* its employees according to some agreed formula) were not a major feature of the British companies' employee reward system prior to 1979. Such schemes as there were either distributed profits to employees directly in cash or alternatively made a bonus issue of shares to employees. In either case the distribution (whether in cash or shares) attracted Schedule E tax at the recipient's highest marginal tax rate on

its full value. Where the bonus was given in the form of shares of the employing company there were not, usually, any conditions attached which prevented an employee disposing of his shares as soon as they had been received, and, in such circumstances, employees were frequently encouraged by stockbrokers to sell their holdings immediately upon receipt, thereby transforming them into cash so as to provide what seemed to be a more readily recognisable and appreciated form of bonus.

The object of the 'new scheme' provisions in the 1978 Finance Act was to encourage employees receiving profit-sharing bonuses by way of shares to retain those shares and thus become not only employees but also part-owners in their company. To achieve this, the 1978 Act provided income tax concessions for employees participating in schemes 'approved' by the Board of Inland Revenue. Originally there was a £500 ceiling on the market value of shares which could be transferred to any one employee in a tax year under such a scheme, but this limit has been raised by successive Finance Acts, first to £1,000 (1980), then to £1,250 (1982) and finally in the 1983 Finance Act to an annual limit of 10% of an employee's earnings, subject to a maximum of £5,000.

Among the pre-conditions for the formal approval of schemes under the Acts is a requirement that participating employees must agree to their shares remaining with Trustees for a prescribed minimum period ('the period of retention'), during which the shares may not be sold save in very exceptional circumstances. The participant will not then be liable to pay income tax on the value of the shares at the time of their appropriation to him, though if he realises his shares after the end of the retention period but before the 'release date' (the date upon which tax liability ceases) he will be liable to pay income tax on a percentage of the value of the shares at the date on which they were appropriated, or on the proceeds of sale if lower; the percentage being tapered as shown in Table 1, according to the length of time since the shares were appropriated.

¹*House of Commons Debates* (Hansard), see e.g. Vol 947, 1977/78 (Apr 3 to Apr 14) cols 1201, 1222, 1411, 1419, 1421, 1443, 1445.

Table 1. Percentage of original value (or sale proceeds if smaller) chargeable to Schedule E tax

<i>Period of retention</i>	<i>1978 FA provisions (operative from 6.4.79)</i>	<i>1980 FA amendments (operative from 6.4.80)</i>
Under 2 years	sale not permitted	sale not permitted
2 years and over but less than 4 years	sale not permitted	100%
4 years and over but less than 5 years	sale not permitted	75%
5 years and over but less than 6 years	50%	50%
6 years and over but less than 7 years	50%	25%
7 years and over but less than 10 years	25%	Nil
10 years and over	Nil	Nil

At the release date (originally 10 years after appropriation but now 7 years), the employee becomes the full beneficial owner of the shares, and can thereafter keep them or sell them without attracting any income tax liability. In the interim the shares are held by the Trustees of the scheme.

The provisions of both the 1978 and 1980 Finance Acts are concentrated upon the tax relief available to participating employees, but there is also provision² that the cost to the employer of providing such benefits can be considered a tax deductible expense to be set against the company's profits. Nevertheless it is apparent from the relevant Inland Revenue booklet³ that the setting up and administration of these new schemes is inevitably complex and relatively costly for the companies concerned. Moreover, the additional tax bands introduced in the 1980 Finance Act (and applicable to sales of shares on successive dates between the end of the retention period and the release date) must add considerably to the administrative burden.

Also, it must not be forgotten that (though the costs of the new schemes may be tax deductible) companies undertaking such schemes need to find considerable annual sums by way of bonus if their schemes are to become and remain significant in the eyes of the employees. It could perhaps have been expected that the new profit-sharing legislation would arouse little interest in companies not already operating some form of general profit-sharing.

Underlying the new legislation is the idea of a gradual build-up of sizeable shareholdings by individual employees. Any effects on the proportion of shares held by the personal sector must, therefore, be considered cumulatively. Three main factors will determine whether the legislation is likely to have any significant effects on this and on industrial attitudes (and possibly profitability):

- the number of companies willing to participate in the new schemes
- the number of shares allocated annually to employees, and

- the length of time for which the employees are willing to hold their shares after the end of the retention period.

The number of companies willing to participate

Each new scheme must receive Inland Revenue approval in order that the tax concessions may become available. Consequently, Inland Revenue statistics for companies submitting schemes for approval provide an excellent base from which to judge the strength of movement towards profit-sharing under the new legislation. Table 2 shows quarterly figures for the period from inception to 31 March 1983.⁴

It can be seen that there was, as might have been expected, an initial surge of interest during the first twelve months following the 1978 Finance Act. What might not have been so readily expected is that, four years after the commencement date, the Inland Revenue would still be receiving such a steady flow of draft scheme submissions.

The number of participant companies is still not very large, but the trend towards initiating these schemes certainly shows little sign of abating. If this continues over the long term, the overall effect of the new legislation could be significant for industry, particularly if the participating companies could show positive benefits arising from the new schemes by way of improved industrial relations and increased profitability.

The number of shares allocated annually to employees

In the latter part of December 1979, a preliminary approach was made to 92 listed companies known to have shown an interest in establishing profit-sharing schemes under the new arrangements, asking them for details of their proposed schemes.

²Finance Act 1978, c. 42, Part II s. 60.

³I.R. 36, *Approved Profit-Sharing Schemes*.

⁴Correspondence with the Inland Revenue, 7 July 1980, 12 February 1981, 3 September 1981, 17 August 1982 and 7 June 1983.

Table 2. Inland Revenue statistics for new schemes

<i>Date</i>	<i>Schemes submitted (cumulative total)</i>	<i>Quarterly increase</i>	<i>Schemes approved (cumulative total)</i>	<i>Quarterly increase</i>
1979				
31 December	186	62*	78	26*
1980				
31 March	230	44	122	44
30 June	255	25	146	24
30 September	277	22	164	18
31 December	306	29	184	20
1981				
31 March	327	21	210	26
30 June	352	25	227	17
30 September	374	22	247	20
31 December	384	9	261	14
1982				
31 March	400	17	278	17
30 June	420	20	297	19
30 September	443	23	310	13
31 December	456	13	328	18
1983				
31 March	476	20	344	16

*Average for the first three quarters.

Eighty one replies were received, and these indicated that 69 new schemes were either already in operation or were scheduled to begin within twelve months from 6 April 1979 (the first date upon which appropriation of profits under the new legislation was permitted); a further 7 companies had a new scheme under consideration but no details had been submitted to shareholders; and the remaining 5 companies had abandoned the idea.

Of the 69 companies where new schemes had been implemented or were expected to be implemented prior to 5 April 1980 (the 'positively responding companies'), 54 had had no previous experience of 'all employee' profit sharing, although employee participation had been encouraged in 25 of these companies through senior executive share option schemes and/or save-as-you-earn share option schemes.

To obtain some indication of the possible extent of the transfers of shares to employees, it is necessary to know not only the size of the nominal base of capital, but also the proportion of that capital which the company envisages transferring to its employees. This is an area in which the Stock Exchange is concerned to see that the interests of existing shareholders are protected through an awareness of the size of the transfers contemplated. The listing requirements include the following:⁵

The scheme, which must be approved by the company in general meeting, must contain provisions relating to:

- (i) the persons to whom securities may be issued or sold under the scheme;
- (ii) the total amount of the securities subject to the scheme which must be a stated figure (the circular must state the percentage of the issued share capital represented);
- (iii) the fixed maximum entitlement for any one participant.

In response to provision (ii), the positively responding companies provided shareholders with the information in Table 3. This suggests that there are concentrations around 5 and 10% in the limits imposed on total nominal capital to be appropriated to profit-sharing schemes, with an implication that all the positively responding companies taken together would look to an eventual transfer to employees of something between these limits. Such a transfer of control would be effected within the lives of the profit-sharing schemes, which in the majority of cases are stated to be initially for ten years.

So far as (iii) above is concerned, with very few exceptions the fixed maximum entitlement stated for these schemes was that contained in the 1978 Finance Act, i.e. £500, with provision for amendment subject to shareholder approval.

Again, the rate at which shares are transferred to employees will affect not only the prospective

⁵*Admissions of Securities to Listing*, The Stock Exchange, Apl 1979, P. 18 para 30(b).

Table 3. Limit on total nominal capital to be appropriated to employees*

Co. size by nominal issued share capital	(as % of total nominal issued ordinary share capital)											Total companies
	1.0 & under	1.1 -2	2.1 -3	3.1 -4	4.1 -5	5.1 -6	6.1 -8	8.1 -9	9.1 -10	Over 10	Not stated	
£100M and over	1	—	1	—	2	—	—	—	3	—	1	8
£10M-£50M	1	1	1	—	2	2	—	1	11	1	1	21
£2M-£10M	1	—	—	1	6	—	—	—	11	1	1	21
Under £2M	—	—	—	—	2	—	—	—	11	1	5	19
Totals	3	1	2	1	12	2	—	1	36	3	8	69

*In many cases companies are running parallel executive share option schemes and/or 'immediate' share schemes (as opposed to the new schemes which defer sale for at least 2 years). In all but one of these cases the above limits apply to total nominal capital which may be subscribed on behalf of employees.

growth rate of individual employee shareholdings but also the importance of personal sector shareholders vis-à-vis other types of shareholders. Some recommendations are made to companies on these issues by the Investment Protection Committees of the British Insurance Association and the National Association of Pension Funds who have issued 'Guidelines' to their members, compliance with which they consider to be essential 'if excessive dilution of present shareholders' entitlement is to be avoided'. These Guidelines⁶ include requirements that:

- The aggregate amount of new equity share capital to be issued by way of subscription in any year for the purpose of the new schemes should not exceed 1% of the share capital in issue on the day preceding the appropriation of profits; and
- The aggregate amount to be appropriated in any year out of profits for all profit-sharing arrangements should not exceed 5% of profits,

before tax and extraordinary items, which are attributable to UK operations.

It is stressed by the Investment Protection Committees that these guidelines are maxima 'which the Committee would not expect to be utilised in the great majority of cases'.

In respect of (a), the evidence is that three out of four positively responding companies have inserted a clause in their schemes complying with the recommended 1% limit on annual issues of new shares; the remainder made no mention of this limit in the information they issued to shareholders. The reaction to (b) may be seen in Table 4.

It is clear that most companies undertaking the new schemes left themselves with the maximum flexibility for transfers of shares to employees while remaining within the guidelines laid down by the Investment Protection Committees. It is, however, important to remember that all the limits stated are *upper* limits and that no lower limits are given, so that there is no reason why transfer should not fall well below the upper limits.

Clearly the number of shares to be transferred under these schemes would be dependent upon several interrelated factors, even if companies

⁶Circular letter published by the National Association of Pension Funds (IPC 233) and the 'Guidelines' published by the Investment Protection Committee of the British Insurance Association dated 21 November 1978.

Table 4. Upper limit on proportion of UK pre-tax profits to be made available in any year

Co. size by nominal issued share capital	Percentage of profit						Limit not stated as % of profits	Total number of companies
	1%	2.5%	3%	4%	5%	7.5%		
£100M and over	1	—	—	2	2	—	3	8
£10M-£50M	—	1	1	2	14	—	3	21
£2M-£10M	1	1	—	1	17	—	1	21
Under £2M	—	—	1	2	15	1	—	19
Totals	2	2	2	7	48	1	7	69

were to transfer the maximum possible amounts to the trustees of the new schemes. Some examples of possible constraints arising from these inter-relationships are given below:

- (a) In a company with few employees and a high profit, total distribution would be limited by the statutorily imposed ceiling on annual appropriations to individual employees.
- (b) Where a company has a large number of employees, a high profit and a small nominal capital, the 1% Investment Protection Committees' annual maximum transfer could provide the effective constraint on the total number of shares transferred.
- (c) Where a company has a low profit and a large number of employees, it is the profit factor which will limit overall distribution.
- (d) Where there is a high profit, a large number of employees and a large nominal capital (and especially where the market value of the shares is several times their nominal value) it is likely that only a very small percentage of total nominal capital would be transferred, even in cases where the full 5% of profit were appropriated.

With so many variables affecting the outcome, it seemed that the best way to obtain a reliable indication of the possible impact of the new schemes on share ownership would be to approach the positively responding companies with a more detailed enquiry requesting information about actual distributions made during the first year that the new schemes became operative. A questionnaire was therefore compiled and despatched to 68 such companies. (One company had previously indicated that it would be unwilling to provide any further information.)

A response to the questionnaire was received from 44 of the companies approached—a response rate of almost 65%. Of the companies responding, 11 were unable to supply full details as first appropriations had yet to be made and the requested information was therefore not available; the remaining 33 companies supplied full questionnaire data.

Such a response rate can be viewed as particularly satisfactory if set against the total of all operative new schemes at that time. Returns made to the Inland Revenue⁷ by companies operating the new type of profit-sharing trusts show that only 75 trusts actually made appropriations during 1979/80 and the participating employees of the 33 companies giving full survey data (the 'full data companies') constitute some 74.8% of the total of all employees to whom appropriations were made under the new schemes during that year. The full

data companies fell into the following size categories:

<i>Company size by nominal issued share capital⁸</i>	<i>Number of companies</i>
£100M and over	8
£10M to £50M	7
£2M to £10M	11
Under £2M	7
	33

The results of the survey were examined for relationships of actual appropriations to the upper limits stated in the schemes outlined to shareholders, particularly in respect of profit appropriations and percentages of nominal capital transferred. Of the 33 full data companies, 20 had previously set a maximum 5% limit on the profits to be appropriated to profit-sharing schemes, 6 had set the limit at 4, 2 at 2.5% and 1 at 1%. The remaining 4 companies placed a limit on the total permitted appropriation which did not relate directly to company profits. Table 5 shows a comparison of these stated upper limits with the percentage of profits actually appropriated to the new schemes during their first year of operation.

What emerges from the survey is that, out of the 29 companies stating an upper profit limit, only 5 actually made a profit appropriation at the maximum permitted amount, i.e. 3 companies specifying a 4% limit and 2 companies specifying a 5% limit. In the majority of cases the actual amounts appropriated to the new schemes fell well below the maximum limits permitted by the trust deeds setting up these new schemes.

This generally cautious approach to profit appropriation limits is not altogether surprising when consideration is given to the many different bases of calculation for total appropriations under the new schemes. Only 5 of the 33 companies based their calculation of total appropriation on a straight percentage of profits. In all other cases the profit figures only indirectly affected the totals appropriated to the new schemes. The two most popular bases of appropriation were lump sums fixed at the discretion of the directors (10 companies) and appropriations based on a percentage of total annual remuneration of employees (9 companies). Three companies based their calculations on the ratio of employee costs to value

⁸Despite the lack of any participating company in the nominal capital size range of £50M to £100M, it is suggested that, as the survey covered so large a proportion of employees to whom appropriations were made in this first year of new scheme operation (the 42 companies not in the survey representing between them only 25.2% of total participating employees), the survey can be said to be reasonably representative of the range of companies undertaking this type of profit-sharing during 1979/80.

⁷Correspondence with the Inland Revenue, 27 August 1982.

Table 5. Comparison of first appropriations with upper limits stated in the new scheme trust documents*

<i>Actual % of profit appropriated</i>	<i>Upper limit stated in trust deed</i>					<i>Total companies</i>
	<i>5%</i>	<i>4%</i>	<i>2.5%</i>	<i>1%</i>	<i>No limit</i>	
<i>0.01-0.49</i>	4	—	—	1	—	5
<i>0.50-0.99</i>	4	1	—	—	2	7
<i>1.00-1.49</i>	2	2	1	—	1	6
<i>1.50-1.99</i>	1	—	—	—	1	2
<i>2.00-2.49</i>	4	—	1	—	—	5
<i>2.50-3.49</i>	2	—	—	—	—	2
<i>3.50-4.49</i>	1	3	—	—	—	4
<i>4.50-5.00</i>	2	—	—	—	—	2
<i>Total companies</i>	20	6	2	1	4	33

*The figures in the columns represent the number of companies falling into the percentage pairings represented by the matrix.

added, using a sliding scale percentage of profit to given ratios; 5 companies—all operating parallel cash and/or immediate share schemes—specified a percentage to be allocated only after a certain minimum profit level had been reached, and in the one remaining company the total was based on the number of shares already purchased by employees and held for them by trustees at the date of the current appropriation. The maximum profit limits can therefore be seen in most cases to be peripheral to the main calculations of total profit to be appropriated to the schemes.

Despite the fact that appropriations are not, in most cases, linked directly to the amount of profit earned by the company, it is possible to see from the bases of appropriation that profits have a significant bearing on the total amounts distributed under the new schemes. For example, where the appropriation is a lump sum based on directors' discretion, it is unlikely to be large when profits are low. On the other hand, where allocation is based on the salaries, the percentage is to be fixed annually at the discretion of the directors, so that even here profits are likely to determine the overall amounts to be distributed. In the great

majority of cases, so much is left to the discretion of directors that it would not be possible to make predictions about future allocations, even if profits could be estimated with certainty. Nevertheless, it remains possible to monitor the movement of share capital under these schemes for the first year of their operation. Table 6 shows the proportion of total nominal ordinary share capital transferred to employees under the new schemes by the 33 'full data' companies. The figures in each size range indicate the number of companies which transferred the percentage of nominal capital shown by the column heading.

To give an indication of the considerable amounts allotted by these companies to their new profit-sharing schemes, Table 7 summarises the appropriations under the new schemes both in value and in the amount of nominal ordinary share capital transferred to employees. The proportion of nominal capital transferred varies inversely with the size of the nominal capital base of the company—the smaller companies transferring the largest proportion of their nominal capitals to their employees. The total of nominal share capital transferred by these 33 companies under the new

Table 6. Percentage of total nominal ordinary share capital transferred to employees during the first year of operation

<i>Size of company by nominal share capital</i>	<i>Percentage of shares transferred</i>										
	<i>0.01-0.09</i>	<i>0.10-0.19</i>	<i>0.20-0.29</i>	<i>0.30-0.39</i>	<i>0.40-0.49</i>	<i>0.50-0.59</i>	<i>0.60-0.69</i>	<i>0.70-0.79</i>	<i>0.80-0.89</i>	<i>0.90-0.99</i>	<i>1 and over</i>
<i>£100M and over</i>	1	4	1	—	2	—	—	—	—	—	—
<i>£10M-£50M</i>	2	1	1	1	—	1	—	—	1	—	—
<i>£2M-£10M</i>	3	2	2	1	—	1	1	—	1	—	—
<i>Under £2M</i>	1	1	1	—	1	—	—	—	—	2	1
<i>Totals</i>	7	8	5	2	3	2	1	0	2	2	1

Table 7. First year appropriations 'full data' companies

<i>Capital base of company</i>	<i>Number of companies</i>	<i>Total appropriation to new schemes £</i>	<i>Nominal capital transferred £</i>	<i>Total nominal capital in size range of sampled cos. £</i>	<i>Percentage of nominal capital transferred %</i>
<i>£100M and over</i>	8	21,422,503	4,259,294	2,194,579,484	0.19
<i>£10M-£50M</i>	7	4,350,093	570,532	183,646,414	0.31
<i>£2M-£10M</i>	11	1,044,088	165,191	48,565,057	0.34
<i>Under £2M</i>	7	175,896	33,407	7,607,396	0.44
	33	26,992,580	5,028,424	2,434,398,351	0.207

schemes was only of the order of 0.2% of their combined total ordinary share capitals; further reference is made to this later.

The period for which employees are likely to hold shares

The overall cumulative effect of the transfer of shares to employees must depend not only upon the number of participant companies and their annual transfers of shares to employees but also upon the period for which such shares are held after the end of the compulsory two-year retention period. Obviously a great deal will depend upon the time preference rates of the recipients of the shares as well as upon their attitudes towards share ownership and towards their employing companies. At this stage, there can be no hard and fast guide. However, a follow-up survey of the full data companies is being carried out, as the compulsory retention period has now expired in respect of their first year appropriations.

It is likely that considerations of movements in share prices and the size and incidence of dividend payments will have a direct bearing upon share sales by employees, in much the same way they would have for other types of investor. A further consideration to be borne in mind is the apparently sharply declining tax burden over time, which might on the face of it seem extremely attractive to

any taxpayer. However, if we consider these benefits in conjunction with the fact that no tax relief is earned until the beginning of the fifth year, they are not quite as generous as they might at first appear. The tax relief given as an incentive for share retention can be looked upon as additional annual income, but in evaluating it we need to take into account the whole period of retention necessary to earn it, and not simply attribute it to the year in which it becomes available. Thus 'hold or sell' decisions must take into account not only prospective inflation rates during the period of intended retention, likely market prices at the end of that time, and current yield per share, but also this in-built addition to income achieved by retaining shares.

Upon becoming a participant in one of the new schemes, an employee signs an agreement that the shares allotted to him cannot be sold until two years has elapsed since their acquisition. His choice to hold or sell his shares does not therefore arise until the beginning of the third year. Income streams arising as a result of tax concessions therefore become possible from the beginning of the third year.

Table 8 shows the relevant additional income yielded as a result of the 1980 Finance Act tax concessions in respect of rates of tax of 30 and 60%, for shares sold between the end of the retention period and the release date.

Table 8. Approximate compound annual yield obtained by holding shares*

<i>Shares sold at the beginning of year:</i>	<i>% annual yield over period held (tax = 30%)</i>	<i>% annual yield over period held (tax = 60%)</i>
3	0	0
4	0	0
5	5 $\frac{1}{4}$	17 $\frac{1}{4}$
6	6 $\frac{3}{4}$	20 $\frac{1}{2}$
7	7 $\frac{1}{4}$	20 $\frac{3}{4}$
8	7 $\frac{3}{4}$	20 $\frac{1}{4}$

*Assuming all shares are sold at or before the release date.

Clearly, the higher his marginal rate of taxation, the greater will be the employee's incentive to hold the shares allocated to him up to the release date. However, the 30% rate for 1982/83 applied to taxable income up to £12,800, and only comparatively small numbers of higher paid employees would be likely to experience marginal rates of tax in excess of this. Nevertheless, even at the 30% rate, provided that an employee is receiving a reasonable return by way of dividend and that the market price of his shares remains relatively stable, the prospect of an annual return of between $5\frac{1}{4}$ and $7\frac{10}{4}$ % extra by way of tax concessions may well tip the balance in favour of holding the shares at least until the release date—a full seven years after acquisition.

It is, of course, quite probable that many of the non-management employees will remain unaware of the true value of the tax benefits, and will hold the shares to obtain the apparent benefits as defined by the Inland Revenue leaflets and as notified to employees by companies operating the new schemes (Table 1) without taking into account the time factor involved. In this case, again provided the market value of the shares remains relatively stable, it is probable that non-management employees will keep the shares at least for the seven years to the release date, unless individual circumstances make this impracticable.

If this type of employee shareholding were to lead to the increase in productivity and profits hoped for by government, then such increases might be expected to be reflected in higher share prices and dividends well before the end of the seven years to the release date. In such cases, increasing dividends on currently held shares with the consequent rise in market value, an enhanced proprietary interest which could accompany an annually increasing individual shareholding, and the relative difficulty (for shareholders without previous stock exchange experience) of selling shares once they have passed out of the hands of the trustees, could combine to ensure that shares, once acquired, might be held until considerably after the final release date.

Possible effects upon the proportion of shares held by the personal sector

Shares are acquired by new scheme trustees from two sources. Either a new issue of shares is made specifically for the purpose of subscription by the trustees of the employee share scheme, or existing shares are purchased by the trustees through the Stock Exchange or by means of a privately arranged transaction.

The method of acquisition is relevant to the question of changes in the proportions of share

capital held by different sectors of shareholders. If shares are acquired by new subscription, this is bound to increase the proportion held by the personal sector—the new shares being allocated in total to that sector. If, however, shares are acquired on the Stock Exchange or by private purchase, it is possible that there will be no change in the relative amounts held by each sector. At the other extreme, if the shares are acquired from institutional holders, the effect will be greater than if the shares were acquired by way of new subscription.

In fact, for the 33 'full data' companies, shares were acquired in 20 cases by new subscription, in 11 cases through the stock exchange, and in 2 cases by private purchase. The 20 cases of acquisition by new subscription included 7 of the 8 companies in the over £100M class. In the remaining company of this size category, trustees acquired by private purchase shares formerly owned by the Government.

Looking again at the transfer of shares under the new schemes (Table 7), even if all the purchased shares (as opposed to new subscriptions) were acquired from a sector other than the personal sector, and if all the participating employees were to hold their shares for the full seven years to the release date, then taking first year appropriations as an indicator of likely annual additions to the new schemes, it is clear that the transfer of nominal capital to the personal sector of shareholders would be unlikely to exceed 1.5% over the seven years to the release date. This figure is, of course, only for transfer of capital in the companies which are already participating in the schemes. If we also consider that the number of companies undertaking the new schemes remains relatively small, the impact of the new profit-sharing schemes in relation to total nominal capital of *all* companies is likely to be negligible. However, because in the majority of cases shares are acquired by trustees through new subscription, as more and more companies enter this new form of profit-sharing, and as the cumulative effects are felt, there should be a small but positive movement towards personal sector shareholding as a result of the new legislation.

The case for a review of incentives

From the survey material it can be demonstrated that the effective limit on the extent of employee shareholding arising from the new schemes is not so much the overall contributions that companies are willing to make to employee profit-sharing, as the reluctance of employees themselves to accept the deferred nature of the new profit-sharing benefits.

Table 9. Companies operating profit-sharing schemes prior to 6 April 1979
(a) Participating employees:

<i>Capital base</i>	<i>Number of companies</i>	<i>Employees eligible</i>	<i>% of total employed</i>	<i>Employees participating in new schemes</i>	<i>% of total eligible</i>
<i>£100M & over</i>	6	328,155	85.34	50,569	15.41
<i>£2-£10M</i>	4	4,289	76.47	447	10.42
<i>Under £2M</i>	1	2,100	62.69	280	13.33
	11	334,544	85.02	51,296	15.33

(b) Cash appropriations:

<i>Capital base</i>	<i>Number of companies</i>	<i>Appropriation to all schemes £</i>	<i>Appropriation to new schemes £</i>	<i>% of new scheme appropriation</i>
<i>£100M & over</i>	6	102,575,000	14,215,894	13.86
<i>£2M-£10M</i>	4	527,942	95,894	18.16
<i>Under £2M</i>	1	430,000	52,707	12.26
	11	103,532,942	14,364,495	13.87

The 33 'full data' companies employed between them almost 512,000 people in the first appropriation year. Of these nearly 392,000 would have been eligible to participate in the new schemes operated by their companies, yet fewer than 108,500 did so. Again, of a total of over £116M allocated to all-employee profit-sharing by these companies, less than £27M was allocated to the new schemes. Had the full amount allocated to all profit-sharing been used to purchase shares under the new schemes, the proportion of shares which could have been transferred to employees in this one year alone would have been in the region of 1.2% of the combined nominal share capitals of these 33 companies, against the 0.2% of nominal capital actually transferred (see Table 7).

Eleven companies alone provide the key to this important difference—six in the over £100M class, four in the £2M-£10M class and one in the under £2M class. They share an identifiable common element: a profit-sharing scheme in operation prior to April 1979, through which employees received bonuses either in the form of immediately saleable shares or cash. Employees in all these companies were given the option either to continue receiving their present 'immediate' (but taxable) bonus in cash or shares, or to switch to the tax-free deferred shares of the new schemes. Table 9 shows the low take-up of new scheme shares in these eleven companies.

In the remaining 22 'full data' companies, the new schemes represent a first venture into employee profit-sharing of any kind, and employees were offered deferred shares or nothing. As might

be expected, eligibility and take-up figures in these companies are identical.

At this stage it will be convenient to review the motives underlying government interest in profit-sharing. First, does this interest lie mainly in government's belief that profit-sharing itself will bring improved industrial relations by providing a common goal of profitability for both management and employees? Second, how much significance does government attach to actual *shareholding* by employees (i.e. how much importance is given to the 'identity' factor?); and third, how much weight does government give to the implications for industrial investment?

If government interest were weighted towards the first motive alone, it need only concern itself with encouraging profit-sharing in any form in a wider spread of companies. The tax concessions offered by the 1978 and 1980 Finance Acts are not indicative of such an unqualified interest. If, on the other hand, it considers the 'identity' motive to be important—and the recent legislation certainly suggests this—government needs to encourage the introduction of new scheme profit-sharing not only in companies new to profit-sharing altogether, but also in ways which will persuade employees in 'immediate' profit-sharing schemes of the advantages of taking up new scheme shares instead of their present 'immediate' share (or cash) incentive bonuses.

That government does attach importance to the investment implications of providing profit-sharing for employees through the medium of *newly subscribed* shares is evidenced by the only

Table 10. Approximate compound annual yield obtained by employees in pre-April 1979 schemes on a transfer into the new schemes*

<i>Shares sold at beginning of year:</i>	<i>% annual yield over period held (tax = 30%)</i>		<i>% annual yield over period held (tax = 60%)</i>	
3	0	(N/A)†	0	(N/A)†
4	0	(N/A)†	0	(N/A)†
5	2½	(N/A)†	8	(N/A)†
6	4	(4)	12	(12)
7	4¾	(3½)	13½	(9½)
8	5¼	(4)	14	(11½)
(9)		(3½)		(10)
(10)		(3½)		(8½)
(11)		(3½)		(9½)

* = Assuming all shares are sold at or before the release date.

†'N/A' indicates that shares were not permitted to be sold except in cases of death, retirement, disability or redundancy of the employee.

direct tax concession accruing to companies as such from employee profit-sharing. For, whereas profits normally ploughed back into a business bear the burden of corporation tax at the full rate, amounts devoted to employee profit-sharing are a tax deductible expense. The profit so appropriated is then transferred to the profit-sharing scheme trustees, who in turn purchase from the company at the full market rate the shares newly issued for this particular purpose. The company thus in effect retains profits in the business tax free, paying therefore only its current cost of equity capital, and avoiding the normal expenses associated with a new issue of shares.

The implications of the 1978 and 1980 legislation are that government is motivated mainly on the second and third fronts. It is suggested that if this be the case government could do still more, at negligible cost, to encourage both the breadth and depth of the new schemes' penetration. It has already been demonstrated (Tables 5 and 6) that there is scope for extension of these schemes within the guidelines laid down by the Investment Protection Committees. What further steps could government readily take?

The 1983 revision of the tax-free ceiling (to 10% of annual earnings with a £5,000 maximum) gives additional benefit only to employees earning in excess of £12,500 a year. The positive impact of this additional concession will therefore be small. Indeed, it is possible that its effect on productivity could even be negative, in as much as it emphasises rather than reduces the division between management and workforce. What seems to be required is a two-pronged government incentive aimed, on the one hand, at encouraging more companies to initiate new scheme profit-sharing and, on the other, at providing better financial inducements to encourage employees already in immediate

profit-sharing schemes to transfer to the new schemes.

Some attempt was made in the 1980 Finance Act to improve the attraction of the deferred share schemes for employees already in immediate profit-sharing schemes, by reducing the compulsory retention period from five years to two. In this, government went some way towards recognising the aversion of employees to tying up capital sums for lengthy compulsory periods, though this improved concession was to an extent offset by the new tax provisions affecting years 2 to 4, as Table I indicates. The effects of the above changes and of raising the individual limit from its original £500 are not reflected in the survey data, since the latest distribution date included here is May 1980, when the 1980 Finance Bill had still to be enacted. There may already have been some increase in the relative share of new scheme to total profit-sharing appropriations as a result of the 1980 measures.

For employees having the option of taking immediate cash or shares, the additional rate of return arising as a result of tax concessions is somewhat different from that of new scheme participants without this option. In the former case, the decision is not simply whether to 'hold or sell' at the end of a retention period, but a decision whether to receive cash or cash equivalent immediately or to hold in order to obtain the additional income equivalent tax concessions which start at the beginning of the fifth year after acquisition of the shares.

Table 10 shows the relevant additional income yielded to employees already in profit-sharing schemes who transfer to one of the new schemes. The corresponding additions to income yielded by the 1978 Finance Act tax concessions are shown in parentheses alongside the 1980 figures. The decision-relative advantages of a smooth

progression of annually increasing tax concessions become immediately apparent when comparison is made between the 1980 figures and the fluctuating yields given by the 1978 concessions. At these rates of notional additional income arising as a result of tax concessions, the inducement for employees paying tax at a rate of 30% to transfer to the new schemes is not particularly strong.

If employees paying tax at a rate of 30% are to be successfully weaned from immediate share schemes, it seems certain that the deferred share schemes will have to be made still more attractive. By bringing the tax concession dates forward two years, and setting the final release date at the end of the fifth year the incentive to transfer to the new schemes could be considerably increased. Compulsory retention of only two years, followed by an *immediate* decline in tax liability similar to that provided after the fourth year in the 1980 legislation, would hold far greater attraction than the prospect of waiting a full four years before any tax benefit is received at all. Thus, the relevant stream of additional income for 30% tax payers would then become approximately:

- $5\frac{10}{4}\%$ for shares held to the beginning of the 3rd year
- $6\frac{10}{4}\%$ for shares held to the beginning of the 4th year
- $7\frac{10}{4}\%$ for shares held to the beginning of the 5th year
- $7\frac{1}{4}\%$ for shares held to the beginning of the 6th year

A reduction in the period to the release date from seven years to five need not necessarily mean that shares would be held for shorter periods than under the present legislation, as the same arguments would hold for retention after the release date as were mentioned earlier. That there would initially be a source of loss of tax revenue to the government is inevitable, but this would only be a short-run disbenefit if the strategy had the long-run effect of increasing overall profitability of companies.

At present, government gives no more *direct* incentives to companies introducing new schemes than to companies with 'immediate' profit-sharing schemes. Yet the new schemes, with their complicated trusts and deferred share sales at differing rates of tax, are far more complex and costly to administer. It is clear that, depending on the numbers of employees participating, companies have already found it necessary to recruit additional staff to administer the new schemes. It may be that some companies (otherwise willing to introduce new schemes) are being deterred by this.

If a government were convinced that the economy would benefit from this particular form of industrial participation, it is possible that it might

consider some *direct* tax incentive to interested companies. Perhaps a scale of allowances to be set against taxable profit, related to the number of employees participating, could add to the number of companies willing to initiate new schemes, and would also encourage companies to draw their employees' attention to the additional benefits obtainable through the deferred schemes, rather than as at present merely offering employees the option of transferring into the new schemes out of the more easily administered immediate cash and share schemes.

Conclusion

This article has been concerned to assess the probable effects of the 1978 and 1980 tax legislation on profit-sharing in its present form, and to identify means by which government could amend such legislation to increase the overall effectiveness of profit-sharing schemes in transferring a more significant proportion of company ownership into the hands of employees.

From the foregoing it appears that the effect on personal sector shareholding of the 1978 and 1980 legislation is unlikely to be great, but clearly the *potential* is there for these new schemes to affect considerably the shareholding patterns in the companies undertaking them. For this potential to be realised, however, further incentives are required.

A pointer to the future could be given by ICI, which has one of the best known and longest running records of profit-sharing. If we look at this over the decade ending on 31 December 1979, a marked upward trend in appropriations in real terms can be observed: from a distribution of £8M (representing profit-sharing of 4p per £1 of employee remuneration received) in 1970, the appropriation to profit-sharing rose in 1979 to £40M (a rate of 8.1p per £1 of remuneration). That this rising distribution trend has been somewhat upset by ICI's poor trading results in 1980, and its consequent withholding of any profit-sharing distribution, can only be seen as a minor hiatus in a steadily rising progression. Several other companies with previous experience of profit-sharing also appear to have followed this upward trend in appropriations.

From the modest beginnings indicated in Tables 5 and 6, therefore, it may be that many of the companies entering profit-sharing for the first time will gradually increase their total allocations (particularly where such allocations are wholly dependent upon directors' discretion). The establishment of confidence has a great part to play in the future of employee profit-sharing: confidence of employees that extra effort will be directly (and perceptibly) rewarded; confidence of management that a system of reward, based on effort, will bring

increased co-operation from the workforce; and confidence of boards of directors that effort-related increased employee rewards need not adversely affect the net return on capital employed.

The period necessary for the establishment of such confidence depends to a great extent upon the proportion of companies willing to introduce new

scheme profit-sharing, upon the method companies use in financing shares allocated to employees, and upon the willingness of employees to demonstrate their own confidence in themselves and their employers by retaining shares beyond the retention date, as well as upon the additional profits generated as a result of improved worker co-operation.

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Audit Reports: Their Impact on the Loan Decision Process and Outcome: An Experiment

Keith A. Houghton

Bailey has recently argued against the use of security price research methods (SPRM) in research involving measurement of the impact of audit opinions. He noted that there are two important research questions that one can ask in assessing the information content of audit reports:

Q1. Does this audit report convey information not conveyed through unaudited financial statements?

Q2. Does this audit report convey information not conveyed through a different audit report? (Bailey, 1981, p. 142)

He suggested that, so long as there exist regulatory requirements (presumably statutory or otherwise) necessitating the auditing of accounting reports, SPRM are incapable of answering Q1. This is because the decision outcomes measured on the stock market are measured solely in relation to accounting information that has been, or will be, subjected to the rigours of an audit.

One possible further limitation of SPRM is that, conventionally, the only dependent variable measurable relates to the decision outcome. However, the impact of an audit opinion has more dimensions than simply the decision outcome; Libby (1979, p. 100) states that the communication of an audit opinion has three component parts: 'the accuracy of the user's perception of the auditor's intended message (link 1); the impact of the perceived message on the user's decision (link 2); and the resulting impact on the decision outcome (link 3)'. SPRM appear to be capable of only measuring link 3, or perhaps a mixture of all three links without individual distinction. This limitation is, however, not restricted to SPRM. Research based on experimental methods can also suffer from similar problems. The studies of Estes and Reimer (1977) and Firth (1979) (both of which used field experiments) also looked at the impact of audit qualifications and also focused solely on the decision outcome of lending bankers without reference to the bankers' perceptions of the auditors' in-

tended message or the impact of the message on the bankers' decision processes. Although both studies were based on an experimental design, neither took the opportunity to look at the issue raised in Bailey's Q1: the audit/no audit question.

Bailey's Q1

A major difficulty in examining the relative impact of audit/no audit opinion is the availability of unambiguous data. Regulatory environments conventionally require accounting reports to be audited. Australian legislation, however, does not require an audit for a certain class of corporation. This class, exempt proprietary companies, is characterised by smaller entities with closely held, non-public shareholdings. It excludes, therefore, all companies which are listed on a stock exchange (the audit data base for SPRM). This regulatory environment makes feasible an inquiry into the impact of any audit information compared to none. Since such an inquiry cannot be based on stock market data, an alternative methodology to SPRM must be adopted. Bailey (1982, p. 146) noted that 'The only viable alternative to SPRM seem to be questionnaire methods'.

The study reported here is based on an experimental methodology and is concerned with the impact on both the lending decision *process* and decision outcome of Australian bank staff made by the presence of an audit opinion (clean or qualified) compared to no audit opinion. In addition, a comparison is also made between the impact of an unqualified opinion compared to qualified audit opinion (a comparison that is relevant to Bailey's Q2 noted above).

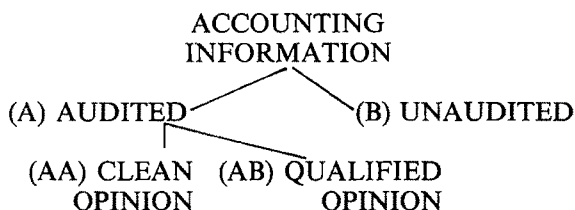
The remainder of this paper is divided into four sections: a brief discussion of the specific areas of inquiry of this research: the methodology, including the construction of the research instrument and selection of respondents; the analysis of results, including an examination of the bankers' decision outcome and apparent decision process as it relates

to audit information; and some concluding remarks.

The areas of inquiry

In regard to Bailey's Q1 (the first area of inquiry of this research), it is widely argued within the accounting profession that the rigour imposed by an audit results in the production of financial reports that are seen by informed users as more reliable than reports which are not subjected to such testing. Therefore, one would anticipate that the presence of an unqualified (that is, 'clean') audit report might have a favourable influence on the loan decision process and outcome compared to no report. Further, a qualified audit opinion might still have a positive influence on the decision process (because the audit has still been undertaken) but a less positive influence on the outcome. The second area of this research, Bailey's Q2, partially replicates the Estes and Reimer (1977) and Firth (1979) studies using Australian data. It is based on the proposition that, when presented with audited financial information, bank staff are more inclined to approve a loan application which has data including a clean audit opinion, compared to data which include a significantly qualified audit opinion.

The research design can be represented diagrammatically as follows:



Accordingly, this study sought to test two sets of hypotheses (stated here in the null form):

(a) *Decision outcome*

H1: The decision outcome of bank lending staff to approve or decline a loan application is unrelated to the presence of a clean or qualified audit opinion compared with no audit opinion¹ (states AA and AB compared with state B).

H2: The decision outcome of bank lending staff to approve or decline a loan application is unrelated to the presence of a clean audit opinion compared with a qualified audit opinion (AA compared with AB).

(b) *Decision process*

H3: The decision process of bank lending staff in dealing with a loan application is unrelated to the presence of an audit opinion compared to no audit opinion¹ (A compared with B).

H4: The decision process of bank lending staff in dealing with a loan application is unrelated to the presence of a qualified audit opinion compared to a clean opinion (AB compared with AA) or no opinion (AB compared with B).

Research methodology

As explained above an experimental methodology was employed. A set of hypothetical financial statements and a loan application were distributed to 247 practising Australian lending bankers.

The Research Instrument

The financial statements contained comparative data for the years ending June 30, 1978 to 1980 (Australian bankers typically use a minimum of 3 years comparative data in processing loan applications). The data distributed included balance sheets, income statements, statutory declarations, funds flow statements, notes to the accounts, and audit information (where appropriate). A brief description of the company's history and banking arrangements was also given. The financial characteristics of the company were such that it could quite reasonably fall within the exempt proprietary class, although the company's exact status was not specified. Given the financial characteristics of the company the inclusion or exclusion of the audit report could have been considered unexceptional.

The set of financial statements was developed by varying the order of magnitude of the annual reports of an existing Australian company. The order of magnitude of the company chosen was such that it would be a significant account for most of the bank branches surveyed. The amount requested (\$60,000) was within the discretionary limit of most respondents. This allowed respondents much discretion in their decisions, resulting in individual decisions rather than referral to higher management. The financial statements were prepared in full compliance with appropriate statutes and the reporting standards of the Institute of Chartered Accountants in Australia. The financial relationships disclosed were in accord with national averages for all companies (Australian Financial Review, 1981, pp. 27-30).

¹ Given the probability that only a small proportion of exempt proprietary companies do have some form of audit undertaken, a banker might classify an applicant company in the exempt/non-exempt categories simply on the basis of the presence or absence of an audit report. Thus H1 might be restated as: the decision outcome of lending bank staff to approve or decline a loan application is unrelated to the status (exempt/not exempt) of the company. H3 would be similarly altered. Given that the financial details of both cases were identical, the principal difference between the two classes in this experiment is the presence/absence of the audit report.

The audit reports were prepared. One audit report was unqualified, the other contained a 'subject to' qualification. (The appendix contains copies of both audit reports and the related footnote.) The qualification chosen was drawn from a publicly issued set of financial statements. It concerned legal action taken by a former employee against the subject company which, if upheld, would involve the company in potentially significant damages, and, in any event, in material legal costs. The company made no provision for any aspect of the costs associated with the legal action. The auditor's report did not quantify the amount of the potential liability, although a reasonably extensive explanation of the qualification was made in the report, together with a reference to the footnote wherein the contingent liability was also disclosed. Legal opinion obtained by the author suggested that damages from successful action would be of a magnitude to risk the continued viability of the company. The existence of the writ was referred to in the notes to the accounts included in the financial statements.

A formal loan application was attached to the financial statements. Whilst inconsequential by comparison with the borrowing of major public companies, the amount requested (\$60,000) is material by comparison to the net worth of the company in question (1980: \$178,815). The interest rate chargeable was stated as being subject to the directions of the Reserve Bank of Australia for loans of this magnitude. This allowed for any interest rate movements during the response period. Security offered was in the form of a floating charge over assets with a balance sheet valuation of approximately \$220,000. The assets included inventory (balance sheet value, 1980: \$75,355) and accounts receivable (net \$39,900). Data in the notes to the accounts suggested that the bad debt experience of the company was minimal. The remainder of the security comprised equity in plant and equipment (\$92,905) and land and building (\$11,125). Data included in the notes to the accounts suggested the valuation of land to be conservative.

The loan application and supporting statements were prepared in conjunction with an accounting firm experienced in the production of such documents. Whilst these documents resembled information conventionally produced for loan applications respondents did not have the opportunity to interview company executives or inspect the premises, which would normally form part of the processing of a loan application. It is acknowledged that this may result in respondents placing greater reliance on accounting information than would normally be the case, but this is a limitation of the methodology employed.

A pretest of the instrument was conducted using a limited number of respondents all of whom had

previous bank lending experience. This resulted in only minor additions and modifications.

The Sample

Over 200 different offices of six of the seven major trading banks in Western Australia participated in the study. The population of experienced lending staff in the six banks was approximately 400. Three of the banks allowed access to all appropriate staff, the other banks supplied only a 'representative' sample. In all, 247 individuals' names were supplied and all were used in the experiment.

Three groups were randomly selected from the sample. One group (comprising 82 participants) received the research instrument with a qualified audit opinion, the second (also 82 participants) the clean audit report and the third (83 participants) received no audit information.

The Task

Unlike the Estes and Reimer (1977) and Firth (1979) studies, the loan officers were asked either to approve or disapprove the application and not to consider the maximum amount of the loan they would make available. This difference was necessary in order to replicate, as closely as possible, the nature of decisions made by Australian bankers. Conventionally, these bankers are asked to approve or decline an amount specified by the applicant.

In addition to arriving at a decision (approve/decline), participants were asked to:

- (1) state the steps of the process they progressed through in coming to their decision;
- (2) state the single most important and other reasons for making their loan decision; and
- (3) give certain biographical and work details.

Analysis of results

The initial response rate was 63.1%. The follow-up procedure resulted in an additional seventeen responses being received after the initial closing date. A total of 173 responses were received, representing a response rate of 70%. (Responses from the different banks varied; however all were greater than 50%.) In an effort to detect non-response bias a split halves test (first half of responses received compared with second half received) was conducted. Although it is acknowledged that, at best, such tests are only crude indications of non-response bias, no evidence of such bias was found. Approximately equal numbers of responses were received for each of the three groups (see Table 1).

A comparison of biographical and work experience data showed that respondents in each of the

Table 1.
Responses by Audit-Type Group

	<i>Absolute Frequency</i>	<i>Relative Frequency</i>
No audit report	60	34%
Clean opinion	55	32%
Qualified opinion	58	34%
	173	100%

three groups had similar characteristics in relation to age, education, banking experience, lending experience, and self-perceived ability in analysing financial statements.

Lending Outcomes and Process

Since the responses in this area of the study were on a nominal scale, a chi square analysis was employed.

In relation to the hypotheses H1 and H2, cross-tabulation of the audit type (clean, qualified, none) by the loan decision (Table 2) shows that the lending decision outcome of Western Australian bankers was not significantly influenced by either the presence or content of audit reports in the case used. Therefore we do not reject the hypotheses H1 and H2 stated above.

There are at least four possible explanations of this result. First, it could be that bank lending staff are not fully aware of the significance of an audit opinion. Second, the conventional wording of audit opinions may have become so overused that it has become meaningless or ineffectual. Third, the traditional audit report may not provide information considered important by a lending banker. Essentially, all these explanations suggest that the audit report does not rank highly as an important and usable information source to lending bankers. However, this is in conflict with attitudinal evidence available on Australian bankers (Zimmer, 1979, and elaborated in Davison and Houghton,

1980). There is a fourth explanation. It could be that the audit report used in this experiment (although significant in the eyes of the researchers, the legal advisor and the participants in the pre-test) was not of sufficient import relative to other information given to respondents significantly to influence their decision outcome. In other words the signals emitted from the audit report were insufficiently loud, relative to the strength of the signals from other data included in the financial information, to disturb the decision outcome of the bankers.

To accept any of the first three explanations is to suggest that audit reports are unimportant to Australian bankers; to accept the fourth explanation is to acknowledge nothing more than the fact that responding bankers did not think the existence of the clean or qualified audit report significantly affected their decision outcome in the case used. Essentially it is an example of a methodological limitation common to many studies based on an experimental design. Unless and until the problem of respondent fatigue and non-response is overcome, research based on experiments will tend to use limited data (in this study one case each of accounting information, without an audit opinion, with a clean opinion, and with a qualified opinion). This limitation is not necessarily faced by those who use SPRM.

In this research, data on the impact of clean and/or qualified audit information on the decision process as well as the decision outcome of bankers was collected (hypotheses 3 and 4). Analysis of this data is achieved by cross-tabulating respondents' references to the audit report in answer to questions about the reasons for their decision (both the single most important reason and secondary reasons), and steps taken in arriving at that decision (e.g. step taken: 'review audit report' or reason: 'unfavourable audit report') by the audit type (clean, qualified, none) (see Table 3).

In regard to the 'any audit opinion/no opinion' pairing, the relationship was not significant even at the 0.2 level. This lack of significance can be largely attributed to the fact that the respondents did not overtly refer to the clean audit report compared to

Table 2.
Cross-Tabulation of Audit-Type by Loan Decision

	<i>No. of Usable Observations</i>	<i>Corrected Chi Square</i>	<i>Degrees of Freedom</i>	<i>Significance</i>
Clean audit report/ no report	115	0.0001	1	0.99
No report/qualified opinion	118	0.021	1	0.88
Clean report/ qualified report	113	0.141	1	0.71

Table 3.
Cross-Tabulation of Reference to the Audit Report or Topic of Audit Qualification by Audit-Type

	No. of Observations	Chi Square	Degrees of Freedom	Significance
(a) Any audit opinion/ no opinion	173	1.07	1	0.213
(b) Clean opinion/ no opinion	115	0.07	1	0.786
(c) No opinion/ qualified opinion	118	6.96	1	0.008
(d) Clean opinion/ qualified opinion	113	7.71	1	0.006

no opinion (Table 3 row (b)). This is not surprising for, as noted above, the provision of no audit report, as well as the provision of a clean opinion might be seen as unexceptional by Western Australian bankers. The provision of a qualified opinion did, however, stimulate respondents to make some positive reference to the audit report. The frequency of such references was significant when compared with either the provision of no audit report or a clean opinion (Table 3 rows (c) and (d)).

From this one could conclude that the audit opinion, if provided, is at least scanned by Western Australian bankers in sufficient detail to ascertain if the opinion is qualified or not. Further, if the opinion is qualified this causes a positive and measurable impact on bankers about their loan decision process. Given the earlier finding about the loan decision, one could also conclude that whilst the audit opinion may form part of the decision process, its contents may not have an impact on the decision outcome so as significantly to alter that outcome. That is, the information in the audit opinion may not be of sufficient import, relative to other information, to affect significantly the bankers' loan decision outcomes.

Summary and concluding remarks

Using an experimental methodology this study has found that the existence of a qualified audit report does not necessarily have a sufficient impact upon a bank loan decision to alter significantly the decision outcome. This was found to be true when comparing information including a qualification with either information containing a clean audit opinion or no audit information. Further, it was found that whilst not necessarily having a significant impact on the decision outcome the presence of an audit report did play a part in the loan decision process of bankers. These findings are consistent with Firth (1979), who found that audit reports including a severe qualification did

have a significant impact on British bankers' decision outcomes, whereas those involving a less severe qualification did not. The finding is also consistent with Estes and Reimer (1977) who found the presence of a relatively benign qualification had no significant impact on the loan decision outcome of American bankers.

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Appendix

(a) *Extract from notes to the accounts*

10. Contingent Liability

Servox Manufacturing Pty. Ltd. has been named as a defendant in a Writ issued by a former employee of the company. The company has issued a defence and a counter-claim in respect of transactions and events occurring prior to the removal of the former employee of the company.

*(b) Audit opinion to clean report group***AUDITORS' REPORT**

To the Members of Servox Manufacturing Pty. Ltd.

We have audited the balance sheet of Servox Manufacturing Pty. Ltd. at June 30, 1980 and the related statements of profit and loss and source and application of funds for the year then ended, which have been prepared under the historical cost convention described in Note 1, except that certain of the company's fixed assets are reported at valuation. Our audit included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion:

- (a) The accompanying accounts give a true and fair view of the state of affairs of Servox Manufacturing Pty. Ltd. at June 30, 1980 and of its profit for the year then ended.
- (b) The accompanying accounts are properly drawn up in accordance with the provisions of the Western Australian Companies Act, 1961-1979 and so as to give a true and fair view of the matters required by Section 162 of that Act to be dealt with in the accounts.
- (c) The accounting records and other records and the registers required by the Western Australian Companies Act, 1961-1979 to be kept by the company have been properly kept in accordance with the provisions of that Act.

STRAIGHT, ARROW & CO.
Chartered Accountants

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I. M. Straight
Partner

Perth, Western Australia
August 15, 1980

*(c) Audit opinion to qualified audit group***AUDITORS' REPORT**

To the Members of Servox Manufacturing Pty. Ltd.

We have audited the balance sheet of Servox Manufacturing

Pty. Ltd. at June 30, 1980 and the related statements of profit and loss and source and application of funds for the year then ended, which have been prepared under the historical cost convention described in Note 1, except that certain of the company's fixed assets are reported at valuation. Our audit included such tests of the accounting records and such other auditing procedures as we consider necessary in the circumstances.

As explained in Note 10, the company has been named as a defendant in a Writ issued by a former employee alleging wrongful dismissal. The company issued a defence and counterclaim in respect of transactions occurring prior to the removal of the employee. Although no present estimate of costs is available, it is anticipated that significant legal costs will be incurred in connection with this matter. No provision for any such costs has been included in the accounts. In our opinion, subject to the effect of any adjustments that might have been required, had the outcome of the matter referred to in the preceding paragraph been known:

- (a) The accompanying accounts give a true and fair view of the state of affairs of Servox Manufacturing Pty. Ltd. at June 30, 1980 and of its profit for the year then ended.
- (b) The accompanying accounts are properly drawn up in accordance with the provisions of the Western Australian Companies Act, 1961-1979 and so as to give a true and fair view of the matters required by Section 162 of that Act to be dealt with in the accounts.
- (c) The accounting records and other records and the registers required by the Western Australian Companies Act, 1961-1979 to be kept by the company have been properly kept in accordance with the provisions of that Act.

STRAIGHT, ARROW & CO.
Chartered Accountants

.....
I. M. Straight
Partner

Towards a Theory of Stochastic Exit Value

Amy Hing-Ling Lau and Hon-Shiang Lau

The use of stochastic concepts in financial accounting has been gaining wider support and acceptance in the literature. As early as 1949, Anthony suggested that financial statements should indicate the level of uncertainty associated with each of the reported accounting values; and more recently, both the American Accounting Association's *ASOBAT* (1966) and the AICPA's *Objectives of Financial Statements* (1973) have explicitly recognised (i) the desirability of expressing accounting measurements as stochastic values and (ii) the limitations of the traditional single-number estimates used in accounting reports. Subsequently, Nakano (1976) and Chen and Summers (1977) have provided detailed theoretical arguments for the desirability of stochastic accounting values. Nakano directed his attention to exit values, using a hypothetical scenario and an assumed decision model to illustrate the usefulness of stochastic exit values. These earlier works suggest that the arguments of stochasticity for (i) exit values (ii) replacement values and (iii) book values do not entirely overlap each other. We have chosen to focus on exit values in this paper. Section I below will review the relevant portions of earlier exit value research. In Section II, we argue that if exit values are to be used, it is logically necessary to adopt a stochastic concept of exit values. The implications of this stochastic concept for the earlier exit value research are then examined. Section III discusses the various possible formats for presenting stochastic exit values, this discussion revealing another source of 'non-additivity' (quite different from the one considered by Larson and Schattke, 1966) inherent in some formats of presenting exit values. Section IV explains why such traditional criteria as 'conservatism', 'objectivity' and 'comparability' become less important in a stochastic exit value accounting system. Finally, Section V considers the importance of the 'reliability' criterion and the approaches of evaluating reliability for stochastic exit value estimations. In the paper, the terms 'exit value' and 'net realisable value' (NRV) will be used interchangeably.

I Brief review of relevant literature

Exit value accounting has been suggested as being

more meaningful than traditional historical cost based accounting; unfortunately, exit values (hereafter 'evs') are often thought to be less 'objective' and less 'verifiable' than the historical cost based book values (hereafter 'book values' or 'bvs'). However, the empirical studies summarised in this section indicate that evs are at least as 'objective' or 'verifiable' as bvs. Three dispersion measures relevant for comparing evs with bvs in this context are:

(i) Ijiri-Jaedicke's (1966) 'objectivity' measure:

$$V = \sum_{i=1}^n (x_i - \bar{x})^2/n \quad (1)$$

where x_i is the value reported by the i^{th} measurer for the same asset and

$$\bar{x} = \sum_{i=1}^n x_i/n.$$

(ii) Ijiri-Jaedicke's (1966) 'reliability' measure:

$$R = \sum_{i=1}^n (x_i - x^*)^2/n \quad (2)$$

where x^* is an ascertainable 'correct value.'

(iii) Parker's (1975) 'comparability' measure:

$$C = \sum_{i=1}^n (x_i - \bar{x})^2/n \quad (3)$$

which applies to a situation where there are n identical assets, each owned by a different firm, and x_i is the valuation reported by the i^{th} firm. Note that although the right hand sides of equations (1) and (3) appear identical, they have different meanings since their x_i s are defined differently.

In the studies of McDonald (1968) and Sterling & Radosevich (1969) (see also Sterling (1969)), CPA subjects were asked to (i) estimate the NRV of specified assets, and (ii) report a bv for the same assets. McDonald's data show that the NRV estimates have lower V values (see equation 1) than the bvs. In the Sterling-Radosevich study, the NRVs and the bvs have similar V values.

McKeown (1971) first derived, for each plant asset of a firm, the V value of its bvs resulting from the various GAAP methods. Next, he regressed the nationwide actual auction prices of the same types of assets against a combination of such factors as their age, condition and list price new. McKeown showed that, for each plant asset, the standard

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error squared of such a regression model is lower than the V value of the asset's bvs.¹

Parker (1975) computed the V value of a calculator's evs reflected by the actual bids obtained from various dealers for the calculator. He then obtained the bvs of the same type of calculator from various business owners, and the C value (see equation 3) of these bvs was computed. He found that the evs' V is lower than the bvs' C.¹

II The stochastic concept of exit values

The reported ev of an asset should correspond to the net amount of cash the owner *will* receive if he liquidates the asset. Given this definition, it should be intuitively obvious that this ev usually cannot be estimated in advance with certainty, i.e., the ev has to be stochastic. Prices listed in trade catalogues are often not deterministic evs; they are 'reference prices' around which the buyer bargains with the vendor (a situation familiar to anyone who has traded in a used car). If an outsider has an option on an asset, the option price will probably be the upper bound of the asset's stochastic ev. Similarly, if there is an offer to purchase an asset, the offered price indicates the lower bound of its stochastic ev.

Consider now a gambler X who owns a transferable right (say, a ticket TA) to play a game GA. This game pays the player an amount in dollars equal to the number he obtains by rolling a die. As long as X holds the ticket and refrains from playing the game, the 'realisable value' of the ticket is a stochastic value with the discrete uniform distribution:

$$PA: P(x) = 1/6, x = 1, 2, 3, 4, 5, 6 \text{ (dollars)} \quad (4)$$

Clearly, if an accountant now has to report the realisable value of the ticket (asset), his statement should provide the information of PA in (4). There is no satisfactory way of making this statement with the conventional 'single number' format. It is absurd to report the game's eventual realisable value as '\$3.5'—i.e., PA's mean value. Reporting the realisable value as '\$1' (or '\$2') is also inappropriate, even though the accountant may argue that this figure represents a 'conservative' estimate of the payoff. In the above discussion, if we substitute the 'ticket' with any 'asset' to be valued, and if we consider the 'game' as selling the asset in the market instead of rolling a die, it is clear that giving a single-number ev for an asset is about as meaningful as saying that the realisable value of the game GA is '\$3.5' (or '\$1', or '\$2'). On the

other hand, Nakano (1976) has used basic statistical decision theory to illustrate that the information of PA as given in (4) is useful and relevant to decision making.

Implications for the Studies of McDonald and Sterling and Radosevich

Consider the situation in which the game GA is clearly explained to a number of people, and they are then required to state, in one number, the payoff of GA. Very likely, they will question the desirability of the 'single-number' restriction. However, if this restriction is followed, and no further clarifying instructions are available, then one person may state the value of GA's payoff as '\$3.5', the second may say '\$1' (or '\$2'), etc. This is because different people will interpret the estimation requirement differently; the first may think that he should report the mean value, the second may think that he should report a 'conservative' value, etc.

In the studies of McDonald (1968) and Sterling and Radosevich (1969), the investigators as well as the CPA subjects took for granted that a single-number estimate would be used for an asset's ev. However, one would expect that a CPA is at least subconsciously aware of the fact that an asset's ev is stochastic. Therefore, when a CPA gives only one number as his estimate, there is no way to ascertain whether he interpreted the required estimation as a conservative, optimistic or mean estimate. Since different CPAs would most likely have used different interpretations, these studies are confounding (i) the effects of differences in the CPAs' perception of the asset's ev with (ii) the effects of differences in the interpretation of the nature (i.e., mean value or conservative value, etc.) of the estimates they are required to report.

Implications for Parker's Study

In Parker's (1975) study, the calculator's ev is considered to be superior because the market-determined evs have a lower dispersion measure than the bvs. Assume now that gambler X also has a ticket TB entitling him to play game GB, which has the stochastic payoff:

$$PB: P(x) = \frac{1}{2}, x = \$3 \text{ or } \$4 \quad (5)$$

Perfectly accurate statements of GA's and GB's realisable values should contain all the information stated in (4) and (5) for PA and PB, respectively. However, PA's standard deviation (a dispersion measure) of 1.708 is larger than PB's standard deviation of 0.5. Does this mean that PB is in any way more 'accurate' than PA? Obviously not. The merit of the reported statement of a stochastic value should be judged by the 'closeness' between the reported and the actual probability distributions, but not by the dispersion measures of these distributions. Thus, GA's payoffs may be 'un-

¹McKeown did not consider whether the regression model's R^2 should be compared with the bvs' V-value. Neither did Parker consider whether the evs' V can be compared with the bvs' C. See, however, Hartman & Zaunbrecher's (1976) comment.

reliable', but if PA is the reported statement of GA's value, then it is certainly a very 'reliable' statement of the unreliable game's value.

Similarly, given that the ev of Parker's calculator is stochastic, reporting its ev may be desirable even if the ev has a larger dispersion measure than the bv, provided that reliable techniques are available to estimate the ev's probability distribution. On the other hand, if such techniques are unavailable, reporting the ev may be undesirable if the ev has a lower dispersion measure than the bv.

III Formats for presenting stochastic exit values

Single Number Format

Developed under the traditional deterministic framework, earlier advocacies in current value accounting (e.g., Chambers, 1966, 1967) have pointed out that evs are homogeneous and additive, whereas the traditional accounting values are heterogeneous and non-additive; and that this homogeneity and additivity of evs is a major advantage of a current-value accounting system. However, Larson and Schattke (1966, 1975) have indicated that deterministic evs may not be additive when the 'aggregation problem' is considered (see also related papers by Chambers (1967, 1976), Vickrey (1975, 1979) and McKeown (1972)). Under the stochastic framework, the additivity of single number evs may be invalidated by two additional factors. Firstly, we have pointed out earlier that if an asset's stochastic ev is reported in a single number format without additional specifications, there is no way to ascertain whether the single number ev represents a 'conservative', 'optimistic' or 'mean value' estimate. Therefore, if one single number ev is given for each of a number of different assets, very likely some of these evs are 'conservative' estimates, whilst others are 'optimistic' estimates, etc. Clearly, the 'conservative' ev of one asset cannot be added to the 'optimistic' ev of another asset to obtain the total ev of the two assets.

Secondly, even if it is conventionally established that a single number ev always refers to a specified fractile of the stochastic ev (say, the lower 20th percentile of the stochastic ev, thus representing a 'conservative' estimate), these single-number evs are still non-additive since fractiles are non-additive. That is, if x_i and y_i are respectively the i^{th} fractile of stochastic evs $\tilde{x}$ and $\tilde{y}$, $(x_i + y_i)$ is usually not the i^{th} fractile of the combined ev $(\tilde{x} + \tilde{y})$.

Given the practical importance of additivity in single valued accounting figures, it appears that a single number ev should represent the mean of the stochastic ev since mean values are additive. That is, if μ_x and μ_y are the means of $\tilde{x}$ and $\tilde{y}$ respectively, then $(\mu_x + \mu_y)$ is the mean of $(\tilde{x} + \tilde{y})$.

Mean/Confidence-Interval Format

This is the most widely considered format for presenting probabilistic accounting values (see e.g., Anthony (1949), Oliver (1972), Birnberg and Slevin (1976), Keys (1978) and Chen and Summers (1981)). Unfortunately, confidence intervals are actually pairs of fractiles, and are therefore non-additive.

Mean Variance Format

Among others, Ferrara & Hayya (1970) and Albrecht (1976) have suggested the use of the mean variance format in reporting accounting values. The means and variances are to a large extent 'additive'; i.e., if μ_x , μ_y , v_x and v_y are the means and variances of stochastic evs $\tilde{x}$ and $\tilde{y}$, then $(\mu_x + \mu_y)$ and $(v_x + v_y)$ will be the means and variance of $(\tilde{x} + \tilde{y})$, assuming that the 'aggregation problem' does not exist and that $\tilde{x}$ and $\tilde{y}$ are independent.

More Sophisticated Representations

Theoretically, complete information of a stochastic ev is provided by reporting its probability distribution. But it is cumbersome to report the probability distributions of many stochastic evs in a financial statement. Moreover, for a collection of assets, it is difficult to derive the probability distribution of its ev from the probability distributions of its components' evs. Short of presenting its probability distribution, an ev's important characteristics can be largely communicated by reporting its 'first four moments'. Kottas, Lau and Lau (1978) have discussed in detail the statistical properties of the first four moments and their relevance to managerial decision-making.

However, probability distributions and first four moments of stochastic evs are difficult to estimate. Also, practitioners probably will have difficulty in understanding these reporting methods.

IV On the concepts of conservatism, objectivity and comparability in a stochastic exit value system

Classical accounting theory has established a number of characteristics as being desirable or necessary for accounting values to possess. Among these characteristics, the roles of 'conservatism', 'objectivity', 'comparability' and 'reliability' in a stochastic ev framework will be significantly different from their roles in the traditional single number bv framework. This section will consider conservatism, objectivity and comparability in the context of stochastic evs, and the next section will consider relevance and reliability. One may note that the earlier empirical exit value studies of McDonald (1968), Sterling and Radosevich (1969), McKeown (1971), and Parker (1975) have also focused on the characteristics of objectivity, com-

parability and reliability; but, as will be seen, their perceptions of these characteristics are somewhat different from ours.

Conservatism

The concept of conservatism in conventional accounting theory was developed within the framework of 'book values' and the single number reporting format. Since one explicit objective of using evs is to reflect accurately the assets' realisable values from the market, such rules as 'lower of cost and market value' obviously become irrelevant. For stochastic evs, 'conservatism' may assume a meaningful interpretation under the single number format of reporting; i.e., a 'conservatively' estimated ev may be a lower fractile value (say, the lower 20th percentile value) of the stochastic ev. However, since fractiles are non-additive, it appears unlikely that this interpretation will be widely applicable. When the more detailed 'mean variance' (or 'four moments') format is used to report estimated stochastic evs, one should state as accurately as possible the actual mean and the other moments of the ev's estimated distribution. After that, information on the 'conservative estimates' or 'confidence intervals' is already embodied in the moment estimations and their corresponding density function. Therefore, the concept of conservatism appears to be quite irrelevant for evaluating reported stochastic evs.

Objectivity

The traditional objectivity criterion has also been developed with respect to single-number bvs. Ijiri-Jaedicke's objectivity measure (see equation 1) is designed to compare the 'closeness' among several single number estimates of an asset's value. In estimating stochastic evs, consider a situation where all the accountants give the same estimate of '\$3' as the ev of a certain asset TA. The situation is often much less perfect than what ' $V = 0$ ' as computed from equation 1 would imply; in the worst possible scenario, one accountant may report '\$3' as his optimistic estimate of TA's stochastic ev, while another may report '\$3' as his estimate of the mean, etc., i.e., there is actually much disagreement. Of course, if the meaning of the single number estimates is clearly defined, i.e., whether they represent estimates of the mean, the mode or some specified fractiles, then equation 1 may be used to measure some aspect of 'closeness' among the reported estimates. But even in this case, considering again the example in which all accountants give '\$3' as their estimates of the asset's mean ev, one must note that ' $V = 0$ ' from equation 1 merely indicates their perfect 'objectivity' in estimating the mean. They may still differ considerably in their estimates of the variances or some other stochastic characteristics of the asset's ev. Strictly speaking, in the stochastic framework

one should consider the 'closeness' among the several estimated probability distributions of an asset's ev. Standard statistical methods are available to extend the concept of Ijiri-Jaedicke's formula to measure the 'closeness' among several estimated probability distributions, but their detailed discussion is outside the scope of this paper (however, see equation 6 later).

Although a valid procedure to quantify the objectivity of estimated distributions can be developed, this measure will still be less relevant in a current value accounting system. In a bv framework, very often there is no 'objective truth' in an asset's value, and 'consensus' means 'correctness'. That is, if every accountant agrees that an asset's bv is \$x, then \$x 'has to be' the asset's correct bv. In an ev system, there exists an 'objective truth' in an asset's value, and it is entirely possible to have a wrong consensus. Of course, it is reasonable to expect that, between one group of closely agreeing estimates and another group of widely differing estimates, the former group has a higher probability of being 'correct' than the latter group. Therefore, for evs, the measure of objectivity is only relevant to the extent that it gives some indication of the likelihood of the estimates being 'correct' with respect to some 'objective truth', but it should not be taken as a measure of 'inherent goodness', as is the case for bvs.

Comparability

Much of what was said about objectivity in the preceding subsection is similarly applicable to the role of 'comparability' in stochastic evs. One more point should be added. Considering specifically Parker's (1975) interpretation of comparability as stated in equation 3 and reflected in his empirical study, one may note that two identical machines bought at the same time by two different users can legitimately end up having very different evs some years later. For example, one may have turned out to be a 'lemon' whereas the other has worked exceptionally well, the market price of the machine may differ significantly with location, or the two users may be using different liquidation procedures. The implication of this is the same as in the preceding subsection, i.e., differing ev estimates for similar (or even identical) assets do not necessarily indicate low reliability of any of the estimates, but similar estimates for similar assets do suggest a higher likelihood of the estimates being correct.

V On the concepts of relevance and reliability in a stochastic exit value system

Relevance

The FASB (1977, p. 31) has suggested that 'relevance' and 'reliability' are the two most funda-

mental characteristics of useful accounting values, and that most other desirable characteristics (e.g., comparability, objectivity, etc.) are related to one or the other of the two. In theory, the relevance of evs to decision making is well established in the literature; and, although few earlier works have considered stochastic evs specifically, the relevance of stochastic financial accounting values has been argued by, among others, Anthony (1949), Chen and Summers (1977), Nakano (1976), AICPA's *'Objectives of Financial Statements'* (1973) and AAA's *ASOBAT* (1966). However in spite of these theoretical justifications, published empirical studies (e.g., Oliver (1972), Birnberg and Slevin (1976), Keys (1978) and Chen and Summers (1981)) tend to indicate that stochastic accounting values do not enjoy much 'perceived relevance' among practitioners. However, the issue of how to educate practitioners to use stochastic accounting values is outside the scope of this paper.

One important reason for the low perceived relevance of stochastic accounting values may be the low 'reliability' (or 'accuracy') of stochastic values as perceived by the users. Intuition as well as some empirical evidence (e.g., Stanga (1980)) suggest that it is unlikely for a measurement to have a high level of perceived relevance unless it also has a high level of perceived reliability, implying that a better understanding of the issue of reliability in stochastic evs should contribute to a higher level of perceived relevance in these values. The earlier studies in evs and stochastic accounting values have considered in detail the issue of relevance, but not the issue of reliability.

Reliability

Ijiri-Jaedicke's measure of reliability (see equation 2) depends on the existence of a 'theoretically correct' reference value x^* , and one might say that their measure is one of 'correctness.' In estimating an asset's bv, a 'theoretically correct' value often does not exist, and 'reliability' cannot be measured (Hendriksen, 1970, p. 117) has also made this point). This probably explains the fact that most basic accounting textbooks omit 'reliability' in their discussions. At the same time, 'objectivity' and 'comparability' become the major criteria for measuring 'correctness' indirectly. However, in a stochastic ev framework, since there exists an 'objectively correct' probability distribution for the ev, 'reliability' should replace objectivity and comparability as the primary theoretical criterion for evaluating the 'correctness' of reported evs. In this context, reliability is a measure of the 'closeness' between an estimated probability distribution of a stochastic ev and its 'actual' probability distribution. We will briefly consider two aspects of the reliability issue. The first is: 'how could an estimator obtain an estimated distribution that accurately mirrors the actual probability distribution of

an asset's stochastic ev?' The second is: 'how should a reported stochastic ev be evaluated for its correctness or reliability?' The first aspect may be seen as the 'accounting' problem, and the second aspect as the 'auditing' problem.

Reliability in 'Accounting'

In some cases, the probability distribution of the stochastic ev can be obtained by simulating the liquidation procedure n times to obtain n sample observations from the actual probability distribution; Parker's (1975) procedure of obtaining 20 observations of the 'highest bid' for a calculator is a good example. However, in an operating ev system, it is unlikely that the simulation approach can be practically used for a significant percentage of the assets to be valued. For most other cases, probably a combination of subjective judgement and published market data will have to be used. For example, a 'reference' ev for an asset may be obtained from a relevant trade catalogue, and the various fractiles of the asset's stochastic ev are then subjectively estimated. McKeown's (1971) procedure of using the published auction prices of similar assets to construct a regression model for estimating the mean and variance of an asset's stochastic ev is a good example of a 'systematic' approach of combining market information and subjective judgment. Of course, for operating stochastic ev systems to become feasible, much more effort will need to be directed towards developing practical estimation procedures.

On 'Auditing' Reliability

In evaluating or 'auditing' the correctness of reported stochastic evs, the theoretical ideal is to quantify the 'closeness' between the 'actual' probability distribution and the reported distribution of the stochastic value; however, in practice, the actual distribution is usually unobtainable. As we perceive now, feasible practical auditing procedures may be categorised into three groups. McKeown (1974, pp. 226-227) has briefly indicated the feasibility of the first group of auditing procedures: using published market information and qualified appraisers as sources of confirmation; to these may be added McKeown's (1971) regression technique. These procedures in effect follow the traditional approach of using objectivity, verifiability and comparability as surrogate measures for reliability; one should note that the actual probability distribution of an asset's stochastic ev is not used (and also not available) in these procedures. Quantifying the difference between the reported and the auditor's stochastic evs is quite simple conceptually. For example, if $f_r(x)$ and $f_a(x)$ represent the density function respectively of the reported and the auditor's sto-

chastic ev, a reasonable 'closeness' measure may be

$$R = \int_0^{\infty} |f_r(x) - f_a(x)| dx \quad (6)$$

Equation 6 is given only as an illustration; other measures should be developed and their merits compared; and, of course, when a stochastic ev is estimated in the form of its mean-variance (or its first four moments) instead of its density function, suitable modifications will have to be made.

The second group of potentially feasible auditing procedures is 'market simulation.' Just as the accountant does, the auditor may also use market simulation (as in Parker's (1975) example) to obtain his sample probability distribution of an asset's stochastic ev. If the accountant's and the auditor's estimations are both in the form of a complete probability distribution, the 'closeness' between the two distributions can then be quantified by, say, equation 6. In addition, since in this case the auditor took n sample observations from the 'actual' probability distribution of the stochastic ev, statistical 'goodness of fit' tests (e.g., Pearson's chi-square, Kolmogorov-Smirnov, etc.) can be used to determine, at a specified significance level, whether the two distributions come from the same population (i.e., whether the auditor's findings agree with the accountant's reported estimates). Note that these statistical tests are applicable as long as the auditor's distribution is estimated by sampling from the actual distribution; it does not matter how the accountant obtained his estimation. Having a statistically meaningful way to judge whether the two distributions are sufficiently similar is a major theoretical advantage of the 'market simulation' approach; whereas if both the accountant's and the auditor's probability distributions are subjectively estimated (as outlined in the preceding paragraph) and their 'closeness' is quantified by something such as equation 6, there is no objective way to interpret whether a computed R -score indicates 'excessive difference' or 'sufficient similarity' between the two distributions. The discussion in this paragraph assumes that the estimations of evs are made in the form of complete probability distributions, but it is conceptually straightforward to extend it for the less detailed formats. It is quite conceivable that, as a 'quality control' procedure in a stochastic ev system, market simulation is used to verify the stochastic ev of a small sample of the assets reported.

The third group of feasible 'auditing' procedures consists of using a single observation of an asset's actual ev to judge the accuracy of the reported stochastic ev. If an asset is liquidated after its stochastic ev has been reported, the asset's actual sale price represents the single observation. Alternatively, 'market simulation' may be used to obtain the required single observation. This differs from the market simulation approach of the pre-

ceding paragraph in that only one observation instead of n observations is needed, making it more economical and feasible. After the single observation is obtained, the accuracy of the asset's reported stochastic ev can be judged by using an appropriate 'proper scoring rule'. Although the idea of using a single sample observation of a stochastic value to judge the accuracy of its estimated probability distribution is not intuitively obvious, the use of 'proper scoring rules' to do this is quite well developed in the literature (see, e.g., Murphy & Winkler (1970), Stael von Holstein (1970), and Matheson & Winkler (1976)). In the accounting literature, Gonedes and Ijiri (1974) have also reviewed their applications. For our purpose, it is sufficient to recognise that if a 'proper scoring rule' is used with an observed ev to evaluate the stochastic ev's reported probability distribution, then the estimator-reporter (e.g., the accountant) will be motivated to ensure that his reported distribution is as close to the actual distribution as possible. In our opinion the second and third groups of auditing procedures represent the most fruitful challenges in developing reliable operating ev-accounting systems.

The two preceding paragraphs also reveal that meaningful interpretations can often be made for the difference between an 'estimation' and the 'actual observation(s)' within a stochastic framework, but not within a deterministic framework. To elaborate, suppose that in a deterministic framework the correct value of something is 105 and the estimated value is 92; is the deviation $105 - 92 = 13$ 'unacceptably large' or 'negligibly small'? Clearly, the answer will have to be somewhat arbitrary. In contrast, after an estimated probability distribution is stated for an ev under the stochastic framework, one can easily test whether one or more actual observations agree with this estimated distribution at pre-specified significance levels. This is an interesting and important point, since it contradicts the popular assumption that stochastic estimations are more difficult to verify than deterministic ones.

Concluding summary

This paper has argued that it is logically necessary for an exit value accounting system to adopt a stochastic framework. To preserve the 'additivity' of accounting values under this framework, it was recommended that the stochastic exit values be represented by their means and variances (note, however, that the variances are additive only if the exit values are independent). We also argued that, for stochastic exit values, the traditional criteria of 'conservatism', 'objectivity' and 'comparability' are less relevant, whereas 'reliability' becomes the primary consideration. Approaches for 'auditing'

the 'reliability' of reported stochastic exit values were then discussed.

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Evidence on Accusations of Manipulating Profitability: Adjustments for Inflation by the Nationalised Industries 1976–81*

Andrew Likierman

Introduction

The accounts issued by the major nationalised industries in the six years from 1976 to 1981¹ were characterised by significant differences in the treatment of accounting for inflation. Until 1975 there were relatively few adjustments² and by 1982 specific guidelines had been issued which greatly narrowed the number of options available.³ In between the industries could, and did, adopt a variety of techniques.

The accounts of private sector organisations in this period of course also exhibited significant differences in approach.⁴ But in the case of the nationalised industries, the differences were met by a good deal of public abuse on the grounds that they were using uncertainties about the treatment of accounting for inflation to manipulate their results. This paper examines some of the evidence about those allegations and looks at whether the evidence gives grounds for believing them to be true.

The group taken in this paper are the 17 industries which are statutory corporations and which had their own external financing limit from the government.⁵ Apart from the common factor of state ownership, this is by no means a homogeneous group. The largest are very large by world

standards; the smallest are relatively small even within the UK. Some are heavily subsidised; others are net contributors to government funds. Some are subject to cyclical profit variations; others are not. Some are subject to significant international competition, while others are effectively monopolies. A common factor is that all are relatively complex as accounting entities and most have significant asset valuation problems.⁶ This means that accounting issues not relating specifically to accounting for inflation are often under discussion. These are excluded from the scope of this paper.

For the sake of brevity some names have been shortened (i.e. British Railways Board to British Rail) and three, because of their length, have been reduced to acronyms: The British National Oil Corporation to BNOC, North of Scotland Hydroelectric Board to NOSHEB and the South of Scotland Electricity Board to SSEB.

Before looking at the evidence, it is necessary to set the adjustments in the context of the development of the framework of accounting for inflation by the industries.

Developing accounting for inflation

In general, the legislation setting up each industry has specified that the industry should follow best accounting practice. Indeed, apart from an 'often ignored' paragraph in a White Paper issued in 1961⁷ there was nothing specifying any special treatment until 1978, that is to say after ED 8, PSSAP 7, Sandilands, ED 18 and the Hyde Guidelines had all been issued. By 1978 there were major differences between different industries, some of which had existed for many years. The Post Office

*Presented at the AUTA South East Area Group Conference, September 1982. I am grateful to participants and an anonymous referee for their helpful comments, to Gary Smith of Robson Rhodes for help in analysing the data and to Robson Rhodes for making his help possible.

¹In eight cases the accounts are made up to 31 December of the preceding year.

²Wright, D. M., 'Inflation Accounting in the Nationalised Industries: a Survey and Appraisal', *Accounting and Business Research*, Winter 1979.

³Nationalised Industries Chairmen's Group, *Code of Practice for Current Cost Accounting in the Public Sector Corporations*, NICG, 1981.

⁴See the annual publication *Survey of Published Accounts*, Institute of Chartered Accountants in England and Wales.

⁵Excluded, therefore, are bodies financed by government departments, such as the Civil Aviation Authority, and companies in public ownership such as BL and Rolls Royce.

⁶See for example MacArthur, J. B., 'Valuation of Fixed Assets in the Financial Accounts of Nationalised Industries and the Implications for Monitoring Performance', *Journal of Business Finance and Accounting*, Spring 1980 and Johnson, B. H. F., 'Nationalised Industries and Inflation Accounting', *Public Finance and Accountancy*, February 1977.

⁷Wright, *ibid*, referring to 'The Financial and Economic Objectives of the Nationalised Industries', Cmnd 1337, HMSO, 1961.



had charged supplementary depreciation since 1947, while some industries had made no significant adjustments at all.

Table 1 shows the sequence of major relevant events from 1976 to 1981. In 1978, the government issued a White Paper⁸ which indicated that financial targets would in future normally be set on the basis of CCA figures. In 1979, the finance panel of the Nationalised Industries Chairmen's Group (NICG) issued interim guidelines for the treatment of current cost accounts.⁹ This was followed later in that year by a government policy statement on the subject.¹⁰ In the middle of the following year, SSAP 16 specifically differentiated nationalised industries from other organisations in the treatment of the gearing adjustment.¹¹ The whole matter was at least theoretically laid to rest in final guidelines issued by the NICG finance panel in 1981.¹²

The apparently smooth flow of events in Table 1 does not reveal the ambiguities and confusion which existed over the period. The ambiguities were largely institutional. It was not clear who exactly was responsible for the development of accounting policy. As Table 1 shows, the finance panel of the NICG played a key role in formulating policy, even though it existed only as a voluntary grouping, only had moral authority and could not apply sanctions. Notable by its absence is the Accounting Standards Committee (ASC) which appears to have played no formal part in the development of the debate on inflation accounting for the industries over this period.¹³ The role of three key parts of the government administrative machinery is also unknown because of the normal provisions of secrecy surrounding their activities. Each of the three has a different set of interests, the Treasury having to be consulted on accounting activities, the government accounting service dealing with accounting policy and a group of 'sponsoring' government departments looking after general policy in respect of the industries. It can be surmised, though it cannot be proved, that the different interests resulted in different viewpoints on this issue.

The confusion in the area of policy is well illustrated by the treatment of the gearing adjustment. Until 1979, there were no guidelines and

treatment varied enormously between the industries. The statement late in 1979 by Mr. John Biffin, then Secretary of State for Trade, indicated that the gearing adjustment should not be included in the current cost profit and loss account, except for those industries which the government had decided to return to the private sector. For the others, it was to be included as a footnote. SSAP 16, however, stipulated that the gearing adjustment should not be in the profit and loss account, without making any distinction between industries. The final NICG guidelines then confirmed that the gearing adjustment should be in a footnote, once again, however, not distinguishing between different types of industry.

A composite hypothesis about manipulation

There was a large variety of criticisms put forward, virtually all concerned with the manipulation of the profit figure. Manipulation is of course an emotive word. It implies a deliberate attempt to deceive and it is hardly likely that finance directors would admit to trying to do anything of the kind. However, the presentation of figures in the best possible light is normal practice and the dividing line between normal and abnormal is by no means clear. In the analysis which follows, manipulation will be taken as a pattern which conforms to the hypothesis outlined below. This hypothesis is an attempt to combine the large variety of criticisms put forward.¹⁴

¹⁴A representative selection might be: *Economist*, 29 July 1978, 'Shoot the Nationalised Industry Auditor—No One Would Notice'; *Financial Times*, 31 July 1978, 'State Industry Accounts Muddle'; *Accountancy Age*, 28 July 1978, 'Big Three Disguise Public Profits'; Gibbs, M. and Taylor, B., *Nationalised Industries Accounting Policies*, Consumers' Association, 1979; Heald, D. 'The Economic and Financial Control of UK Nationalised Industries', *Economic Journal*, June 1980; Likierman, A., 'CCA and the Nationalised Industries—Patchy Progress So Far', *Accountancy*, July 1981; Hansard, 1 August 1978 Cols 655–70; Price Commission, *South of Scotland Electricity Board—Price Increases in the Supply of Electricity*, HC 535, HMSO 1978.

Table 1
Major relevant events—1976–81

	<i>General</i>	<i>Nationalised Industries</i>
1976	ED 18	
1977	Hyde Guidelines	
1978		White Paper (Cmnd 7131)
1979	ED 24	NICG Interim Guidelines Ministerial Statement
1980	SSAP 16	
1981		NICG Final Guidelines

⁸*The Nationalised Industries*, Cmnd 7131, HMSO, 1978.

⁹Nationalised Industries Chairmen's Group, *Accounting in Nationalised Industries*, NICG, February 1979.

¹⁰Hansard, 21 December 1979, Col. 454.

¹¹Paragraph 51.

¹²For the final form used, see Likierman, A., 'Nationalised Industries: Accounting for Inflation', *Public Money*, December 1981.

¹³The limbo into which the nationalised industries were cast is illustrated by the fact that their special problems do not seem to have been discussed at any stage. See, for example, C. A. Westwick, 'The Lessons to be Learned from the Development of Inflation Accounting in the UK', *Accounting and Business Research*, Autumn 1980.

a group of industries which were not in direct competition with the private sector and which were embarrassed by high declared historic cost profit reduced their profit by adopting inflation adjustments early, using adjusted accounts as the main accounts and not using a gearing adjustment in the adjusted accounts.

a second group of industries which would not have been profitable with accounts adjusted for inflation, whether they were in competition with the private sector or not, waited to make adjustments and then kept historic cost accounts as the main accounts. When these industries adopted CCA for their subsidiary accounts, they also adopted the gearing adjustment while they were able to do so.

The reasoning behind the behaviour of the two groups is that in the first case, the industries needed accounts adjusted for inflation to reduce criticism of excessive profits in historic cost terms. The second group needed to improve their image by seeming to be profitable rather than loss-making or at least showing as small a loss as possible.

Table 2 examines the industries with a variety of tests. Some of the industries in the table were denationalised after the period covered and the Post Office was split. British Aerospace and British Shipbuilders produced their first set of accounts as nationalised industries in 1977.

Examining the evidence from Table 2 there seem to be reasonable grounds for believing that the composite hypothesis is well-founded:

- The six industries which made adjustments early (by April 1978) and adopted adjusted accounts as the main accounts by the end of the period studied were all profitable in historic cost terms. They were also in fields not directly competitive with the private sector. Five of the six were profitable in the form of accounts adjusted for inflation chosen as the main accounts, although the British Airports Authority was only profitable in pre-tax terms in three out of the four years when adjusted accounts were produced.
- Eight out of the ten industries which adopted adjustments later (after March 1978) and ended up with historic cost accounts as the main accounts were not profitable in CCA terms by the end of the period.
- Of the seven industries which did not adopt adjusted accounts as the main accounts by 1981 and had an option to make a gearing adjustment when this was available, five did so. None of those who had adopted accounts adjusted for inflation as the main accounts by 1981 had made a gearing adjustment.

But there are some ragged edges to the evidence.

For example:

- British Steel and the Docks Board made adjustments early, when the hypothesis indicates that they should have made them late.
- BNOC and British Aerospace should have adopted CCA and made adjustments early under the hypothesis. Neither did so.
- Scottish Transport and National Bus did not adopt the gearing adjustment when the hypothesis indicates that they should have done so.
- The hypothesis indicates that the Electricity Council, like the two Scottish Electricity Boards, should have had historic cost accounts instead of CCA. This would have made it profitable rather than loss making. But it did not do so.

These ragged edges could be explained in a variety of ways. Some industries might have felt that they were about to move from unprofitability to profitability or might have been under pressure from one or more groups inside or outside the industry. Government pressure, for example, could have been applied to those industries such as British Steel which were heavily dependent on government funds. Impending sale to the private sector for industries such as BNOC or British Aerospace, or a clear identification with private sector practice, could have made the industries wish to follow the example of the private sector. Whether such explanations are appropriate will be discussed in the following section.

Difficulties in proving manipulation

Three of the difficulties in providing any substantial underpinning for the kind of accusations given in the hypothesis are given below.

1. *The Difficulty of Proving Motive*

The fact that a particular adjustment was or was not made is not conclusive proof that manipulation has taken place. At a time when there are differences of view about accounting principles, it is not unreasonable for different Boards to take up quite different positions or to be subject to influences not connected with a desire to manipulate the figures. For example, an industry which adopted CCA very quickly might have done so because it believed this to be the most appropriate accounting system, not because it was trying to manipulate. Similarly an industry which had not adopted CCA might put a reasonable case that it was waiting for a definite ruling for practice on nationalised industries and that it would have been wasteful to introduce an interim system. It could even have argued that, bearing in mind its particular commercial circumstances, adjustments providing for full replacement were not appropriate

Table 2
Pattern of adopting adjustments (1976-81)

	First major adjustment ¹	Early or late	Main accounts by end of period	Gearing adjustments in P & L accounts ²	Whether profitable with HC accounts ³	Whether profitable with CCA accounts ⁴
British Aerospace	Suppl. CCA accounts	Late (1980)	HC	—	Yes	Yes
British Airports Authority	Suppl. CCA accounts	Early (1976/7)	CCA	No	Yes	Yes ⁵
British Airways	Suppl. CCA accounts	Late (1978/9)	HC	3 years	5 out of 6 yrs	1 out of 3 yrs
British Gas	Suppl. depreciation	Early (1976/7)	CCA	No	Yes	Yes ⁶
BNOC	Suppl. CCA accounts	Late (1980)	HC	—	2 out of 5 yrs	1 out of 2 yrs
British Rail	Suppl. CCA accounts	Early (1978)	HC	2 years	Yes	No
British Shipbuilders	Suppl. CCA accounts	Late (1980/1)	HC	—	No	No
British Steel	Suppl. CCA accounts	Early (1977/8)	HC	2 years	No	No
British Transport Docks	Suppl. CCA accounts	Early (pre-1976)	HC	—	Yes	No ⁶
British Waterways	—	— (None)	HC	—	3 out of 6 yrs	No
Electricity Council	Suppl. depreciation	Early (1977/8)	CCA	No	5 out of 6 yrs	No ⁶
National Bus	Suppl. CCA accounts	Early (1978)	HC	No	4 out of 6 yrs	No
National Coal Board	Suppl. CCA accounts	Late (1978/9)	HC	2 years	3 out of 6 yrs	No
National Freight	Suppl. CCA accounts	Late (1980)	HC	3 years	3 out of 6 yrs	No
NOSHEB	Suppl. depreciation	Early (1977/8)	HC with suppl. dep.	No	Yes	No ⁶
Post Office	Suppl. depreciation	Early (pre-1976)	HC with suppl. dep.	No	Yes	Yes ⁵
Scottish Transport	Suppl. CCA accounts	Late (1979)	HC	No	Yes	No
SSEB	Suppl. depreciation	Early (1977/8)	HC with suppl. dep.	No	Yes	No

1. Excludes asset revaluations etc.

2. — = no CCA accounts produced at the time when the option to add a gearing adjustment was available (until 1980).

3. After supplementary depreciation (if charged), interest and tax. Figures for some transport industries and the National Coal Board are more difficult to interpret because of the large grants included as revenue. Main accounts in 1981 underlined.

4. = From the time when first published. After interest and tax. Main accounts in 1981 underlined.

5. = Only pre-tax 1977/8-1979/80.

6. = All profitable with supplementary depreciation on historic cost accounts. NOSHEB, Post Office and SSEB used these as main accounts throughout.

since some assets would not be replaced. In practice this would have been an unlikely argument to have given in public since an industry would not generally be willing to concede decline so openly. The fact that there was a policy vacuum until 1978 provides a ready justification for the differences in approach. Combined with the fact that an industry would be unlikely to admit anything of the kind—one does not show one's bargaining cards if trying to influence next year's external financing limit or the next wage round—it is highly unlikely that motive could be established.

The industries certainly felt that they had a case in taking whatever action they thought was necessary and were not slow to present the case in the report and accounts. For example on the gearing adjustment:

'The Post Office considers the suggested "gearing" adjustment to be generally inappropriate' (1977(8))

'The "gearing" adjustment proposed in the interim recommendations issued by the Accounting Standards Committee... is considered to be inappropriate' (British Gas 1977/8)

'The Board are of the opinion that the worth of the current cost profit and loss account is diminished because no account is taken of the effect of inflation on fixed loans' (National Coal Board 1980/1)

Some industries justified a wait-and-see policy:

'There is no agreement yet with regard to gearing... and we therefore believed it was not prudent to take credit for it' (British Airports Authority 1977/8)

'The Board consider that a number of fundamental points regarding the financing of public utilities have to be settled before a meaningful statement can be produced showing the effects of inflation' (NOSHEB 1977/8)

'The Board's Audit Committee... concluded... the time was not yet right to present the main accounts in CCA terms' (SSEB 1980/1)

While there were others who clearly felt that the whole thing was not for them anyway:

'The recommendation (Hyde Guidelines) does not address the particular problems of petroleum exploration and production industry... No purpose would be served by the Corporation's presenting the suggested supplementary statement' (BNOC 1977)

'It is the Board's view that historic cost accounts are most appropriate for this industry' (National Coal Board 1978/9)

While it is possible to dismiss all these statements as special pleading, the industries would presumably equally argue that they believed their

respective stances to be entirely justified. Since there is no way of proving the argument one way or the other, the evidence must remain circumstantial.

2. What Was Being Manipulated?

Most critics of the industry concentrated their criticisms on the manipulation of the profit figure. In some ways this was a curious target. The legislation setting up the industries rarely specified profitability as an objective (for most, indeed, there is only reference to the necessity to break even taking one year with another).¹⁵ Nor, with the exception of Mr. MacGregor at British Steel, was Board remuneration tied to performance in general or profit level in particular. Furthermore, the industries operated in this period within a government control framework of which the main features were the need to meet a financial target (usually a percentage return on net assets) and to operate within cash constraints,¹⁶ not the achievement of target profits.

The choice of the profit figure as the target for criticism is less strange when considering that this is the figure most used by commentators and public figures to indicate the supposed success or failure of an industry.¹⁷ This applies even though, for several industries, grants are a substantial proportion of their total income. A profit figure is also the number most often quoted in press reports on the annual report and accounts. But even here the focus is on different profit figures. In some cases it is on profit after interest and in others profit before interest—a significant difference for many industries whose long term finance has no equity component.

The level to which profit (however defined) was being manipulated was equally unclear. The composite hypothesis was based on the idea that profit needed to be increased for some industries and reduced for others. But this begs the question of what level of profit the industries were aiming at. The idea of 'embarrassing' profitability indicates there is a level of profit which is not embarrassing. If embarrassment is defined in terms of profits running into hundreds of millions of pounds, British Gas, The Electricity Council and the Post Office were certainly vulnerable to this criticism

¹⁵See for example Section 41 (2) of the Transport Act 1968, Section 36 (1) of the Electricity Act 1947 and for an interesting variation Section 14 of the Gas Act 1972.

¹⁶Although this was hardly specified in the 1978 White Paper—see Likiernan, A., 'The Financial and Economic Framework for Nationalised Industries,' *Lloyds Bank Review*, October 1979 and Heald, D., *ibid*.

¹⁷This has not changed since 1981. For example, 'When I say profit I mean real profit—not just smaller losses than usual which is what usually passes for good news in nationalised industries,' Speech by Mr. I. Sproat, 21 August 1982. Reported in *The Guardian*, 23 August 1982.

because of the sheer size of their operations.¹⁸ But the other three industries which moved to accounts adjusted for inflation as their main accounts did not have profit figures of this magnitude. Indeed their historic cost profits would have been exceeded by those of some of the industries which kept historic cost accounts as the main figures.

Special factors could explain the reasoning behind the actions of each of these industries—impending privatisation for British Aerospace, the non-competitive nature of the operations for the British Airports Authority etc.—but such explanations can be seen as part of a defence from attack. Here again, the question of motive is relevant since while the circumstantial evidence remains strong, the figures do not provide the kind of conclusive evidence which would make it possible for the analyst to dispense with accompanying explanations.

3. Differences in Allegations and Between Industries

There is no such thing as an entity called 'the nationalised industries' any more than there is a single criticism made by 'the critics.' The term nationalised industries simply covers a convenient grouping of state-owned enterprises. The significant variations between the industries have already been illustrated and in practice it was those industries which had the public as direct consumers (British Gas, British Rail and the other energy and transport industries) which were subject to most public comment. Others, such as British Waterways were in general little discussed.

The nature of the criticisms also varied greatly. Consumer groups were understandably concerned about those aspects of the accounts which they felt helped to increase prices. So were many Labour MPs. Conservative MPs, on the other hand, were often suspicious of the industries as a whole and particularly those aspects of the figures which might

mean an increased call for cash. Financial commentators were in general more concerned about the nature of the manipulation.

To put the allegations in context, it also needs to be remembered that many were made in circumstances in which making the point was more important than getting the nuances sorted out. Allegations in the press and Parliament were often based more on political considerations than a desire to get at the truth. If it is possible to generalise, it might be that the only factor unifying the criticisms was an unease that something was wrong, even if that something was difficult to pin down.

Conclusion

While the composite hypothesis put forward appears to offer some evidence to support the idea of systematic manipulation, there are a number of factors which must cast doubt on whether such an accusation can be justified. These include:

- the circumstantial nature of the evidence and the difficulty of proving motive;
- the difficulty of defining what was being manipulated and to what level;
- the varied nature of the industries and the allegations.

It may be, of course, that by altering the composite hypothesis or changing the tests used, a better (or worse) fit could be found. But this would lead back to the question of whether the hypothesis is being altered to fit an argument to justify the initial prejudice.

In accounting matters, as in many others, public ownership brings the nationalised industries into the public spotlight. One of the reasons why the industries have often been defensive about aspects of their operation is that it has been clear that those who criticise them have not always been interested in the facts. This may help to explain the reasons for the industries acting as they did and further underlines the importance of looking carefully at statements about profitability made in the context of a public debate.

¹⁸The Electricity Council was certainly aware of this. See for example their evidence (p. 32) to the Select Committee on Nationalised Industries, *Comments by the Nationalised Industries and Others on the Government's White Paper on Nationalised Industries*, 6th Special Report, Session 1977/8, HC 638, HMSO 1978.

Related Qualities of Useful Accounting Information

Thomas E. McCaslin and Keith G. Stanga

In recent years several prominent groups within the USA and the UK have studied the qualities or characteristics of useful accounting information (see, for example, references 1, 2, 3 and 4). In 1980 the Financial Accounting Standards Board (FASB) in the USA issued *Statement of Financial Accounting Concepts No. 2 (SFAC No. 2)*, entitled 'Qualitative Characteristics of Accounting Information'. In this pronouncement the FASB concluded that 'relevance and reliability are the two primary qualities that make accounting information useful for decision making' (4, p. x).

Here is how relevance and reliability are defined in *SFAC No. 2* (4, p. xvi):

Relevance: The capacity of information to make a difference in a decision by helping users to form predictions about the outcomes of past, present, and future events or to confirm or correct prior expectations.

Reliability: The quality of information that assures that information is reasonably free from error and bias and faithfully represents what it purports to represent.

Many accountants believe that relevance and reliability require important trade-offs. In other words, a common belief is that the relevance of accounting information can be enhanced only if one is willing to sacrifice some reliability, and vice versa. In its *Conceptual Framework Study*, the FASB pointed out that:

That kind of trade-off is not new to accountants. [Present] practice is often defended on grounds of the need for reliable . . . information. Critics of present practice often argue that it overemphasizes verifiability at the sacrifice of substantial relevance of the information. They propose to measure attributes other than historical cost to enhance the relevance of the information and are willing to trade some verifiability and reliability to achieve it (3, p. 164).

In 1979 the FASB issued *Statement of Financial Accounting Standards No. 33 (SFAS No. 33)*, entitled 'Financial Reporting and Changing Prices'. *SFAS No. 33* does not change the primary financial statements which are based on historical cost accounting. Instead, the pronouncement requires

certain large companies to disclose selected items of supplementary information in their published annual reports. The supplementary information is presented on a constant dollar basis (that is, adjusted for general price-level changes) and on a current cost basis (that is, adjusted for specific price changes) (5). The objective of the study reported in this article is to determine whether or not relevance and reliability require trade-offs when the accounting measurement basis is changed from historical cost to constant dollar, from historical cost to current cost, and from constant dollar to current cost.

Previous research

In the Winter 1980 issue of this journal, Stanga reported an empirical study of the relationship between relevance and reliability (8). That study, which concluded 'that the financial accounting concepts of relevance and reliability are positively associated', (8, p. 37) was based on data obtained from two groups of users of financial information, chartered financial analysts and chief commercial loan officers. The study used a questionnaire that covered four contemporary issues in financial reporting: (1) Replacement cost reporting as had been required in the USA by *Accounting Series Release No. 190* issued by the Securities and Exchange Commission (this pronouncement is no longer in effect), (2) segment reporting, (3) financial forecasting, and (4) interim reporting.

Stanga's research design permitted an examination of the relationship between relevance and reliability that existed for each of 30 information items included in the questionnaire. The association between relevance and reliability was determined for each information item considered independently from all others. The research design did not permit a systematic examination of the trade-off between relevance and reliability that is believed to occur when the accounting measurement basis is changed.

The research reported in this article is not a replication of Stanga's study but is intended to complement and expand the earlier work. Unlike the Stanga study, the current study uses a matched-

pairs design, made feasible by the issuance of *SFAS No. 33*, to examine the question of whether or not relevance and reliability require trade-offs when the accounting measurement basis is changed. The matched-pairs design is the most important difference between the current study and the one reported earlier by Stanga. In addition to financial analysts and bankers, the current study also encompasses a group not considered in Stanga's study—the preparers of financial information.

Research methodology

Questionnaire Design

We mailed a pretested questionnaire to three groups of preparers and users of financial statements. The groups surveyed are described in the following section of the article and included chief financial officers (CFOs), chartered financial analysts (CFAs), and chief commercial loan officers (CLOs).

The questionnaire consisted of thirty financial information items that were extracted from the disclosures made by a large number of US companies in their primary financial statements or in the supplementary information required by *SFAS No. 33*. The thirty information items were segmented into three categories: historical cost, constant dollar, and current cost. Eleven of the thirty items were prepared on a historical cost basis, eleven were prepared on a constant dollar basis, and eight were prepared on a current cost basis. A listing of the thirty information items used in the questionnaire appears in Table 1.

A matched-pairs design was used when selecting the information items. The matching criterion required that for every questionnaire item in one category (that is, historical cost, constant dollar, or current cost), a similar questionnaire item must be included in one or both of the other categories. For example, companies conventionally report income from continuing operations on a historical cost basis in their primary financial statements. *SFAS No. 33* requires companies to report income from continuing operations on both a constant dollar and a current cost basis. The questionnaire therefore included income from continuing operations prepared on (1) the conventional historical cost basis, (2) the constant dollar basis, and (3) the current cost basis. The matching procedure provided thirty financial information items that were used to generate thirty-one information pairs. These thirty-one pairs are shown in Table 3 which is presented later in the article. The reason for using the matched-pairs design described above is that it permits a study of the *changes* in relevance and reliability that occur when the accounting measurement basis is altered. Thus we can see

Table 1

List of Information Items Used in Questionnaire

1. Income from continuing operations—Historical cost basis
2. Sales or net revenues—Historical cost basis
3. Cost of goods sold (LIFO pricing method)—Historical cost basis
4. Cost of goods sold (FIFO pricing method)—Historical cost basis
5. Depreciation expense (Straight line method)—Historical cost basis
6. Depletion expense (Units of production method)—Historical cost basis
7. Inventory (LIFO pricing method)—Historical cost basis
8. Inventory (FIFO pricing method)—Historical cost basis
9. Property, plant and equipment—Historical cost basis
10. Net assets at year end—Historical cost basis
11. Earnings per share—Historical cost basis
12. Income from continuing operations—Constant dollar basis
13. Sales or net revenues—Constant dollar basis
14. Cost of goods sold (LIFO pricing method)—Constant dollar basis
15. Cost of goods sold (FIFO pricing method)—Constant dollar basis
16. Depreciation expense (Straight line method)—Constant dollar basis
17. Depletion expense (Units of production method)—Constant dollar basis
18. Inventory (LIFO pricing method)—Constant dollar basis
19. Inventory (FIFO pricing method)—Constant dollar basis
20. Property, plant and equipment—Constant dollar basis
21. Net assets at year end—Constant dollar basis
22. Earnings per share—Constant dollar basis
23. Income from continuing operations—Current cost basis
24. Cost of goods sold—Current cost basis
25. Depreciation expense (Straight line method)—Current cost basis
26. Depletion expense (Units of production method)—Current cost basis
27. Inventory—Current cost basis
28. Property, plant and equipment—Current cost basis
29. Net assets at year end—Current cost basis
30. Earnings per share—Current cost basis

directly whether or not relevance and reliability require a trade-off.

The cover letter, the instructions, and the questionnaire itself were each worded very carefully. We never mentioned that we were investigating the question of a possible trade-off between relevance and reliability because such a statement might have biased the results. Instead, we merely stated that

Table 2
Model of a Contingency Table that was Constructed for Each Information Pair^a

		RELIABILITY		
		NO		
		DECREASE	CHANGE	INCREASE
RELEVANCE	DECREASE	Number of Cases	Number of Cases	Number of Cases
	NO CHANGE	Number of Cases	Number of Cases	Number of Cases
	INCREASE	Number of Cases	Number of Cases	Number of Cases

^aThirty-one information pairs (identified in Table 3) were considered in the study. One contingency table was constructed for each of the 31 pairs within each of the three respondent groups, for a total of 93 tables ($31 \times 3 = 93$).

we were studying the perceived relevance and reliability of historical cost, constant dollar, and current cost accounting information—a topic certainly worthy of study in its own right. The terms historical cost accounting, constant dollar accounting, and current cost accounting were carefully described based on *SFAS No. 33*. In addition, the terms relevance and reliability were defined exactly as in *SFAC No. 2*.

So that respondents could indicate how much relevance and reliability they attributed to each of the thirty questionnaire items, *two scales* were placed beside each item. Each respondent was asked to evaluate each information item independently and indicate the number on each scale that best represented his or her personal opinion concerning the relevance and reliability of each information item. Each scale ranged from 1 through 7. A response of 1 on the relevance scale indicated that the item was irrelevant; a response of 7 indicated that it was extremely relevant. Similarly, a response of 1 on the reliability scale indicated that the item was unreliable, and a response of 7 indicated that it was extremely reliable.

Relevance and reliability evaluations are more meaningful when made within a specific decision context that is familiar to a particular respondent group. Accordingly, an appropriate context was established for each of the three respondent groups. Each respondent in the CFA group, for example, was directed to evaluate the relevance and reliability of each information item 'within the context of your making a typical decision to buy, sell or hold a small (noncontrolling) number of common shares in a *large, publicly-held industrial company*'. A similar context was provided for the CFOs and the CLOs within the scope of their decisions.

The Study Participants

An initial mailing was made to a total of 300 CFOs, 300 CFAs and 300 CLOs. This mailing was followed by a second mailing to those people who had not responded to the initial mailing within four weeks. Both mailings occurred during the second half of 1981 at a time when companies had been reporting *SFAS No. 33* information for two years. Thus the respondents had sufficient time to become familiar with constant dollar and current cost measurements before being asked to assess the relevance and reliability of the information.

The CFOs were chosen as a group of preparers of financial information. A random sample of 300 CFOs was selected from *Fortune's* listing of the 500 largest US industrial corporations. The CFAs were selected as one group of users of financial information. A random sample of 300 CFAs was drawn from the national membership directory of the Financial Analysts Federation. To help ensure a reasonably homogeneous sample, the sample excluded retired analysts, those located outside the USA, and those with academic affiliations. The CLOs were chosen as a second group of users of financial information. The 300 CLOs included in the sample represent each of the 300 largest US banks as ranked by the *American Banker*. The response rates are shown below:

Survey Group	Questionnaires Mailed	Usable Responses Received	Response Rates
CFOs	300	112	37.3%
CFAs	300	59	19.7%
CLOs	300	113	37.7%
Total	900	284	31.6%

Table 3
Summary of Kendall's Tau_b Statistics

Table 3 Summary of Kendall's Tau _b Statistics							
Pair No.	Information Pairs	CFOs Kendall's Tau _b		CFAs Kendall's Tau _b		CLOs Kendall's Tau _b	
		Value	Probability	Value	Probability	Value	Probability
Income from continuing operations:							
1	Historical cost basis changed to Constant dollar basis	0.37802	0.0000	0.64521	0.0000	0.49828	0.0000
2	Historical cost basis changed to Current cost basis	0.33272	0.0001	0.68768	0.0000	0.47767	0.0000
3	Constant dollar basis changed to Current cost basis	0.21020	0.0082	0.69003	0.0000	0.41224	0.0000
Sales or net revenues:							
4	Historical cost basis changed to Constant dollar basis	0.23368	0.0049	0.51432	0.0000	0.42014	0.0000
Cost of goods sold:							
5	Historical cost basis under LIFO changed to Constant dollar basis under LIFO	0.43569	0.0000	0.65439	0.0000	0.38551	0.0000
6	Historical cost basis under LIFO changed to Current cost basis	0.45488	0.0000	0.45750	0.0001	0.46290	0.0000
7	Constant dollar basis under LIFO changed to Current cost basis	0.40132	0.0000	0.43060	0.0002	0.35177	0.0000
8	Historical cost basis under FIFO changed to Constant dollar basis under FIFO	0.24034	0.0034	0.58636	0.0000	0.45790	0.0000
9	Historical cost basis under FIFO changed to Current cost basis	0.31008	0.0002	0.21286	0.0380	0.45966	0.0000
10	Constant dollar basis under FIFO changed to Current cost basis	0.26034	0.0016	0.49392	0.0000	0.33575	0.0001
Depreciation expense (Straight-line method):							
11	Historical cost basis changed to Constant dollar basis	0.23958	0.0035	0.50931	0.0000	0.34483	0.0000
12	Historical cost basis changed to Current cost basis	0.27780	0.0008	0.43625	0.0001	0.45368	0.0000
13	Constant dollar basis changed to Current cost basis	0.33114	0.0001	0.31856	0.0039	0.45635	0.0000
Depletion expense (Units-of-production method):							
14	Historical cost basis changed to Constant dollar basis	0.21943	0.0087	0.41526	0.0002	0.32628	0.0001
15	Historical cost basis changed to Current cost basis	0.27645	0.0012	0.32180	0.0038	0.40683	0.0000
16	Constant dollar basis changed to Current cost basis	0.27094	0.0015	0.32748	0.0034	0.43334	0.0000
Inventory:							
17	Historical cost basis under LIFO changed to Constant dollar basis under LIFO	0.39806	0.0000	0.55662	0.0000	0.47913	0.0000
18	Historical cost basis under LIFO changed to Current cost basis	0.46205	0.0000	0.46926	0.0001	0.44182	0.0000
19	Constant dollar basis under LIFO changed to Current cost basis	0.45601	0.0000	0.55025	0.0000	0.28267	0.0006

Table 3 continued

20	Historical cost basis under FIFO changed to Constant dollar basis under FIFO	0.31558	0.0003	0.50269	0.0000	0.47361	0.0000
21	Historical cost basis under FIFO changed to Current cost basis	0.25934	0.0017	0.46005	0.0001	0.51782	0.0000
22	Constant dollar basis under FIFO changed to Current cost basis	0.33947	0.0001	0.46870	0.0001	0.35572	0.0000
Property, plant and equipment:							
23	Historical cost basis changed to Constant dollar basis	0.16843	0.0300	0.50391	0.0000	0.42067	0.0000
24	Historical cost basis changed to Current cost basis	0.27899	0.0008	0.52635	0.0000	0.34360	0.0000
25	Constant dollar basis changed to Current cost basis	0.20361	0.0108	0.41322	0.0003	0.40428	0.0000
Net assets at year-end:							
26	Historical cost basis changed to Constant dollar basis	0.32406	0.0002	0.39655	0.0005	0.52449	0.0000
27	Historical cost basis changed to Current cost basis	0.30595	0.0003	0.45286	0.0001	0.50556	0.0000
28	Constant dollar basis changed to Current cost basis	0.24061	0.0031	0.37436	0.0011	0.46626	0.0000
Earnings per share:							
29	Historical cost basis changed to Constant dollar basis	0.21392	0.0095	0.48486	0.0000	0.37884	0.0000
30	Historical cost basis changed to Current cost basis	0.36259	0.0000	0.57802	0.0000	0.33333	0.0001
31	Constant dollar basis changed to Current cost basis	0.23284	0.0041	0.34322	0.0024	0.40090	0.0000

Test for Nonresponse Bias

We tested for the existence of nonresponse bias by comparing the first-mailing responses with the second-mailing responses within each of the three survey groups. The responses were tested for similarity using the chi-square test for two independent samples.

Recall that each questionnaire contained 30 information items and that two scales, one for relevance and one for reliability, were associated with each item. Thus, 60 variables (30×2) can be compared between the first-mailing and the second-mailing respondents. A chi-square test at the 0.05 alpha level was performed on each of the 60 variables between the first-mailing and the second-mailing respondents within each of the three survey groups.

At the 0.05 alpha level, we would expect approximately three (60×0.05) of the sixty chi-square tests within each survey group to be significant solely by chance. The existence of nonresponse bias would be suspected if the number of significant tests were substantially more than three. In fact, the chi-square tests revealed slightly fewer than three significant results for the CFOs and the CFAs (one item significant in each group) and slightly more than three significant results (five items significant) for the CLOs. The results of these tests do not appear to indicate the presence of a material nonresponse bias.

Statistical Approach

The first step in the statistical analysis was to construct a contingency table similar to the model shown in Table 2 for each of the 31 *pairs* of information items within each of the three respondent groups. The contingency tables permitted a visual examination of the changes that occurred in relevance and reliability when the accounting measurement basis was altered. For each respondent group, eleven tables were developed for the change in measurement basis from historical cost to constant dollar; ten tables were developed for the change in measurement basis from historical cost to current cost; and ten tables were developed for the change in measurement basis from constant dollar to current cost. In total, 93 contingency tables ($31 \text{ pairs} \times 3 \text{ respondent groups}$) were developed. The number of cases entered in each cell of the contingency tables was based directly on the relevance and reliability changes indicated by the respondents for the information items making up the pairs.

The next analytical step was to determine the form of the relationship (if any) indicated by each of the 93 contingency tables. For this purpose we used the Kendall's Tau_b statistic. Kendall's Tau_b

provides a measure of association in an ordered contingency table (6, pp. 45–48). Negative τ_b values would indicate that as we change the measurement basis, relevance increases and reliability decreases, or vice versa. Negative values of τ_b would occur if a trade-off exists between relevance and reliability. In contrast, positive τ_b values would indicate that relevance and reliability change in the same direction (that is, they both increase or both decrease) as we change the measurement basis. Positive values of τ_b suggest that a trade-off between relevance and reliability does not exist. Ultimately, the value of τ_b can vary from -1 which indicates perfect negative association to $+1$ which indicates perfect positive association.

Results

All ninety-three of the τ_b values are positive and statistically significant at the 0.0380 level or less. The thirty-one information pairs considered in the study and the resulting ninety-three Kendall's τ_b values and associated levels of significance are reported in Table 3.

The τ_b values calculated for the CFOs range from 0.46205 with a significance level of 0.0000 to 0.16843 with a significance level of 0.0300. The median τ_b value is 0.27899 with a significance level of 0.0008. For the CFAs the τ_b values range from 0.69003 (significance level = 0.0000) to 0.21286 (significance level = 0.0380), and the median τ_b value is 0.46926 (significance level = 0.0001). Finally, the τ_b values computed for the CLOs range from 0.52449 with a level of significance of 0.0000 to 0.28267 with a level of significance of 0.0006; the median τ_b value is 0.42067 with a level of significance of 0.0000.

Collectively, the results shown in Table 3 provide consistent evidence that the CFOs, CFAs, and CLOs do not perceive a trade-off to exist when the accounting measurement basis is changed from historical cost to constant dollar, from historical cost to current cost, or from constant dollar to current cost. Instead, a direct relationship of moderate amount between relevance and reliability is perceived to exist by the preparers and users who participated in this study.

Discussion of results

The results of the study indicate that relevance and reliability tend to change in the same direction when the accounting measurement basis is altered. Preparers and users of financial statements do not appear to perceive a trade-off between relevance and reliability.

The results suggest that relevance and reliability are not independent qualities and that the capacity of information to make a difference in an actual decision (that is, relevance) may in part be deter-

mined by how much reliability the information is perceived to have. In other words, a person's perceptions of the relevance of information may tend to be influenced by the person's perceptions of the reliability of the information. Relatively unreliable information may simply not have the capacity to influence an actual decision, regardless of how much theoretical relevance the information may possess. Preparers and users may therefore tend to believe that unless information is sufficiently reliable, the information will lack relevance insofar as their actual decisions are concerned. The comments written by many respondents on their completed questionnaires indicated a significant concern over the *reliability* of constant dollar and current cost information. These respondents appear to attribute little relevance to these types of information in their decisions because they are highly sceptical about the reliability of the information.

The results of this study are consistent with those found in other empirical studies of the qualitative characteristics of accounting information. As indicated earlier, Stanga used a research design different from the one used in the present study and found a positive relationship between relevance and reliability. In another study, Morton found a positive association between the qualities of relevance and understandability (7).

An important implication of this study exists for accounting researchers and policy makers. That is, additional resources should be invested in the development of measurement methods designed to enhance the *reliability* of financial information. In the past, researchers and policy makers have tended to concentrate their attention on relevance and have tended to overlook the problems of measurement. But it appears that preparers and users of financial statements may evaluate the relevance of information based, at least in part, on how much reliability the information is perceived to possess.

Conclusion

The research reported in this article was designed to reveal a trade-off between relevance and reliability if in fact a trade-off exists. The tentative conclusion, however, is that the preparers and users surveyed do not perceive a trade-off between relevance and reliability when the accounting measurement basis is changed from historical cost to constant dollar, from historical cost to current cost, and from constant dollar to current cost.

This study did not encompass all preparers and users of financial statements and was confined to thirty information items presented using three different bases of accounting measurement. Al-

though developed and implemented with considerable care, the questionnaire used in the study may not have been capable of capturing the actual relevance and the actual reliability of the information items considered. Additionally, the overall response rate was less than 100%, a fact that raises concern over whether or not the responses received are truly representative of the populations surveyed. These limitations highlight the need for additional empirical research concerning the qualities of useful accounting information.

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The Evolution of the Harmonising Provisions of the 1980 and 1981 Companies Acts*

C. W. Nobes

The 1980 and 1981 Companies Acts of the United Kingdom are substantial pieces of legislation. They dramatically affect financial reporting, in ways which may not be anticipated by a study of the Companies Acts 1948, 1967 and 1976 (which are added to, rather than repealed by, the above Acts). This is because the origins of the new legislation lie outside the Anglo-Saxon accounting tradition;¹ these Acts are part of a process of harmonisation of laws within the European Communities (EC).² In this case, particularly for the 1981 Act, the pattern which was originally chosen as a basis for harmonisation was German, as will be shown.

It is fairly well established that, if one organised the countries of the developed Western world into a small number of groups by their accounting practices, the United Kingdom and West Germany would be in different groups (Mueller, 1967; Nair and Frank, 1980; Nobes and Parker, 1981). The United Kingdom presents a good example of 'accounting as an independent discipline'; of pragmatic accounting; of accounting based on the judgement of 'fairness'. West German accounting, on the other hand, is held up as an example of detailed prescription (by company and tax laws) of formats, measurement rules and disclosure; of accounting which seeks correctness and legality. Thus, it is not surprising that the new UK legislation, being based on German law, introduces many changes, some of which are revolutionary.

This paper is concerned with those substantial parts of the 1980 and 1981 Acts which result from

Directives³ of the EC. Topic by topic, the origins of the new British legislation will be traced to earlier continental law. It should be stressed that the object of this paper is not directly to examine EC harmonisation or the changes to accounting in any other country.

Evolution of the 1980 Act

Those provisions of the 1980 Companies Act which are analysed here result from the second Directive. This section examines how they fit in with existing continental European practice, which is clearly the origin of the second Directive, both drafts of which were published before the UK acceded to the EC (see Figure 1).

1. Company Names

In most Member States of the EC it has long been possible to tell whether a company is public or private by looking at its name.⁴ The split in Germany goes well back into the last century. In France, the 'private company' (*Sàrl*)⁴ form dates from 1925, after the absorption into France of the former German territories of Alsace and Lorraine following the post-war Treaty of Versailles. At that point many *GmbH*⁴ companies suddenly became French; the form was legalised and it spread rapidly. In the Netherlands, the *BV*⁴ was invented in 1971 following the first draft of the second Directive.

The second Directive demands such separation. For the UK, the 1980 Companies Act achieved this by leaving private companies' names unchanged, and causing public companies (which are fewer and

*I gratefully acknowledge the useful comments of D. A. R. Forrester, R. H. Parker, I. C. Stewart and an anonymous referee on earlier drafts of this paper.

¹The 'Anglo-Saxon accounting tradition' is used throughout this paper to refer to the broad consensus, of British origin, which exists on accounting matters throughout most of the English-speaking world. This is perhaps typified by 'fairness' and 'substance over form'.

²In 1983, these are ten: Belgium, Denmark, France, Greece, Luxembourg, Ireland, Italy, Netherlands, United Kingdom and West Germany. The word 'communities' refers to the European Economic Community (Common Market), the European Coal and Steel Community and Euratom.

³Directives are pieces of 'secondary legislation'. They are drafted by the EC Commission, approved by the Council of Ministers, and sent to the governments of Member States for enactment as national laws.

⁴The private company forms in West Germany, France and the Netherlands are *Gesellschaft mit beschränkter Haftung* (*GmbH*), *Société à responsabilité limitée* (*Sàrl*) and *Besloten Vennootschap* (*BV*), respectively. These are not the exact equivalents of the UK private company. Instead, they have some elements of partnerships, particularly in the way in which capital is held.

Figure 1
EC Directives of Especial Relevance to Accounting

Directives on Company Law	Dates of Drafts	Date Approved in Brussels	UK Law
Second	1970, 1972	1976	1980
Fourth	1971, 1974	1978	1981
Seventh	1976, 1978	1983	

more easily visible) to change their names to include 'public limited company' or 'p.l.c.' (S2). The use of the expression, 'proprietary company,' which is found in several Commonwealth countries, was proposed for small private companies in the Green Paper (DOT, 1979) which preceded the 1981 Act. However, this proposal was not enacted.

The legal distinction remains that only a public company's shares may be offered to the public. Thus a listed company must be public. However, there is little point in stressing this distinction unless other differences also follow. Both the 1980 and the 1981 Acts do introduce further differences.

2. Minimum Capital Requirements

It has been normal in continental Europe for there to be minimum capital requirements for companies. (For examples, see footnote 5.) The second Directive imposes such a requirement for public companies. The UK has now inherited these continental provisions in that the 1980 Act introduced a minimum requirement of £50,000 issued share capital for UK public companies (S85). No such requirement has been introduced in the UK for private companies.

3. Number of Members

The minimum number of members of a public company is reduced from 7 to 2 (S2). This does not seem to be predictable from the continental European practice ruling before the second Directive (see footnote 6). However, there is now harmonisation on a minimum of 2 for all types of companies throughout the EC.

4. Distributable Income

Until 1980, the definition of legally distributable income was not to be found in British statute law, but in a miscellany of cases dating back to the last century; for example, *Lee v. Neuchatel Asphalte*

Co. (1889) and *Verner v. General and Commercial Investment Trust Ltd.* (1894). These cases were sometimes difficult to apply, and appeared contradictory.

In Germany, there has been no similar problem. The strict and uniform application of detailed historic cost rules has been designed to lead to a conservative and reliable figure for distributable profit to protect creditors. The same figure is used for accounting profit and for taxable profit. Such a coincidence is attempted in the definition of distributable profit of a company in the second Directive and the UK's 1980 Companies Act (S39): 'its accumulated realised profits . . . less its accumulated realised losses'. However, since it is clear that UK law does not impose uniform rules for the measurement of accounting profit, the Act lays down that, irrespective of the accounting methods used by a company, the legally distributable profit must be based on strict historic cost rules. For example, if any fixed assets have been revalued and depreciation has been based on the revalued amounts, then an adjustment must be made to 'correct' the depreciation charge for the purposes of calculating distributable profits. However, such a calculation, or its result, need not be disclosed in the published accounts. Familiarity with the strict application of the principle of 'purchase price or production cost' in German accounting as determined by the 1965 *Aktiengesetz* (share law or public company law) would render these rules unsurprising. The Directive and the 1980 Act go further by adding more restrictions relating only to public companies.⁷

It is one of the ironies of the legal system of Britain and parts of the Commonwealth that the archaic British case law on distributable profits now applies in several countries (e.g. Australia and New Zealand) but not in the UK.

Evolution of the 1981 Act

In the case of the fourth Directive, the EC Commission entrusted the task of preparing the *avant projet* (the unpublished preliminary draft) to a working party chaired by a German, Professor Elmendorff. It is not surprising, then, that the first draft of the Directive, published in 1971, bears resemblances to the German *Aktiengesetz* (*AktG*) of 1965. The Directive applies to public and private

⁵Before the enactment of the second Directive, the West German minimum capital requirements were: DM 20,000 (*GmbH*), DM 100,000 (unlisted *AG*), and DM 500,000 (listed *AG*). The French figures were the same in francs. Other EC countries also had such requirements.

⁶The pre-Directive numbers, for private and public companies respectively, were: West Germany (2 and 5); France (2 and 7); Netherlands (2 and 2); Italy (1 and 2); UK (2 and 7).

⁷S40 states that a distribution must not be made by a public company if it would reduce net assets below the aggregate of capital and undistributable reserves. The latter are defined at length, and include share premium and capital redemption reserve fund. This requirement will only be more restrictive than S39 where there is an unrealised deficit on revaluation. A connected new requirement in the 1980 Act (S34) is that, where the net assets of a *public* company fall to half or less of the called-up share capital, an extraordinary general meeting shall be called.

companies (except for banking, insurance and shipping companies) of all Member States. It deals with statutory annual balance sheets, profit and loss accounts and notes, but not with supplementary statements like current cost accounts or funds flow statements.

One curious feature of the 1981 Act is that it contains no instructions⁸ about consolidation, and that in various places (like the standard formats) adjustments have to be made for this. Given that statutory accounts for groups of companies in the UK are usually consolidated accounts, this omission might seem hard to understand. However, although the *AktG* required consolidation of domestic subsidiaries by German public companies, consolidation is rare in much of continental Europe (Parker, 1981a) and was rarer still in the days of the early drafts of the fourth Directive. This may explain its absence from the fourth Directive and thus from the 1981 Companies Act. The accession of the UK, Ireland and Denmark to the EC in 1973 was followed by the drafting of the seventh Directive (see Figure 1) which deals with consolidation. This is a substantially Anglo-Saxon document.

The evolution of the accounting provisions of the 1981 Act will be analysed under four headings. In each case, the concentration will be on locating the source of the provisions. In most cases, this will involve tracing provisions from the 1965 *AktG*, through the various drafts of the fourth Directive, to the 1981 Act.

It is not intended here to discuss whether the changes brought from German legislation into British legislation are 'good' or 'bad'. There has been much prior argument about, for example, whether the imposition of uniformity in accounting would be useful. This might now be regarded as a case for empirical investigation rather than further speculation.

1. Formats

Compared with traditional Anglo-Saxon accounting, perhaps the most obvious feature of the *AktG*, the fourth Directive, and the 1981 Companies Act is the prescription of uniform formats. In the UK, formats have not been compulsorily imposed by statute before, except for special companies, like those in life assurance or public utilities. Also, there have never even been format rules in accounting standards.⁹ This revolutionary change

is not only the most obvious of the changes imposed by the 1981 Act, but also one which will be very difficult to avoid. As will be shown later, although the letter of the law also introduces some fundamental changes of principle and detail in the areas of valuation and measurement, it will probably be possible for many companies to avoid important changes to their practices in these areas in the short run.

When tracing the history of formats back into the last century one does come across an optional format for balance sheets in the British Companies Act of 1856 and the consolidating Act of 1862, which remained in force until 1908 (Edey, 1979; Parker, 1981b). Nevertheless, the evolution of the 1981 Act must be traced through previous German law not previous British law.

Perhaps because of the importance of banks and creditors, and the lack of importance of individual shareholders, German accounting has concentrated on the protection of creditors and on cost and management accounting, not on financial statements for shareholders. It was for internal, management accounting purposes that uniform formats were first developed. It appears that the first comprehensive chart of accounts was published in Germany by J. F. Schaer in 1911 (Scherpf, 1955). Such charts were used by industry in the first World War. In 1927, Schmalenbach published *Der Kontenrahmen*, which was followed by the publication of model charts for different industries (Forrester, 1977). Under the National Socialists, the ascendant ideology of controlling the economy led naturally to the compulsory adoption of charts of accounts, particularly as the price mechanism was not operating due to controls on prices and money, and thus some alternative allocation mechanism was needed (Singer, 1943). The Germans also used a system of uniform cost accounting in France in the early 1940s.

As for uniform published financial statements, these were developed in Germany, France and other continental countries. The Germans introduced compulsory formats in the law of 1931 (Barth, 1953). The French first issued a national accounting plan (*plan comptable général*) in 1947 (revised 1957 and 1979). This included both a chart of accounts and formats for published accounts (Most, 1971).

The *AktG* of 1965 lays down formats in its sections 151 and 157 (Mueller and Galbraith, 1966). The *AktG* offered no choice between formats, nor any substantial flexibility within a format. As might have been expected, there was considerable difficulty in arriving at agreed formats for the first draft of the fourth Directive (EC Commission, 1971), even among the six Member States belonging to the EC in 1971 (Niehus, 1971). This shows itself in the inclusion in the Directive of two balance sheet formats and four profit and

⁸There are references to group accounts in the 1981 Act, but only to make clear that the Act applies to them.

⁹SSAP 10 (published by the UK accountancy bodies in 1975) gives formats for funds flow statements in an appendix, but clearly states that they are merely suggestions. SSAP 16 (CCA, 1980) also provides suggested formats, and SSAP 6 (1974) suggests a presentation for extraordinary items.

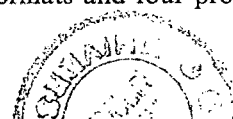


Figure 2
The Evolution of the Balance Sheet (Abbreviated Versions)

<u>AktG (S151)</u>	<u>1971 Draft (Art. 8)</u>	<u>1981 Act (Format 2)</u>
I Unpaid Capital	A Unpaid Capital	A Unpaid Capital
II Fixed and Financial	B Formation Expenses	B Fixed Assets
A Fixed & Intangible	C Fixed Assets	I Intangible
B Financial	I Intangible	II Tangible
	II Tangible	III Investments
III Current Assets	III Participations	C Current Assets
A Inventories	D Current Assets	I Stocks
B Other Current	I Stocks	II Debtors
	II Debtors	III Investments
	III Securities	IV Cash
IV Deferred Charges	E Prepayments	D Prepayments
V Accumulated Losses	F Loss	
	I For the Year	
	II Brought Forward	
I Share Capital	A Subscribed Capital	A Capital and Reserves
II Disclosed Reserves	B Reserves	I Called up Capital
III Provisions for Diminutions	C Value Adjustments	II Share Premium
		III Revaluation Reserve
		IV Other Reserves
		V Profit and Loss
IV Provisions for Liabilities	D Provisions for Charges	B Provisions for Liabilities and Charges
V Liabilities (4 years +)	E Creditors	C Creditors
VI Other Liabilities	F Accruals	
VII Deferred Income	G Profit	D Accruals
VIII Retained Earnings	I For the Year	
	II Brought Forward	

loss account formats. These remained largely unaltered in the second draft (EC Commission, 1974) and the final Directive (EC Commission, 1978).

Looking first at the balance sheet, *AktG* S151 was reproduced with slight amendment as Article 8 of the 1971 draft of the fourth Directive (see Figure 2). This is a two-sided (or horizontal) balance sheet, with assets on the left. The only significant change between the 1971 draft and those of 1974 and 1978 is in the classification of reserves. The *AktG* and the 1971 draft Directive show profits as the last item on the *credit* side of the balance sheet, and losses as the last item on the *debit* side. Such a treatment of profits fits better with a creditors' or entity view rather than a proprietors' view: 'it contains no implications that ... the proprietors possess any particular lien' (Edwards, 1981, p. 17). This had been the presentation shown in the British 1856 Act, and was common in Britain before the Second World War. Edwards (1981, p. 17) notes that perhaps 'it

reflects the mechanical approach to accounts construction then prevailing'.

However, in the final Directive, a more Anglo-Saxon approach to reserves is allowed. Format 2 of the 1981 Act (see Figure 2) follows the Directive, except for permitted deletions like formation expenses, which was a necessary heading for practice in some countries. Figure 2 illustrates the gradual and slight changes in the formats over the sixteen year period. It shows only the first two levels of headings. A third level (of sub-sub-headings) is omitted from Figure 2, but in each case does exist and is preceded by Arabic numbers.

However, it should not be supposed that UK balance sheets will in future look like the expanded version of this Format 2 of the 1981 Act. There are several reasons why this will probably not be the case. First, the Directive contains another format.¹⁰

¹⁰Article 9 of the 1971 and 1974 drafts, which became Article 10 in the 1978 version.

Figure 3
Balance Sheet Format 1 from the 1981 Companies Act

A. <i>Called up share capital not paid</i>	D. <i>Prepayments and accrued income</i>
B. Fixed assets	E. Creditors: amounts falling due within one year
I Intangible assets	1. Debenture loans
1. Development costs	2. Bank loans and overdrafts
2. Concessions, patents, licences, trade marks and similar rights and assets.	3. Payments received on account
3. Goodwill	4. Trade creditors
4. <i>Payments on account</i>	5. Bills of exchange payable
II Tangible assets	6. <i>Amounts owed to group companies</i>
1. Land and buildings	7. <i>Amounts owed to related companies</i>
2. Plant and machinery	8. Other creditors including taxation and social security
3. Fixtures, fittings, tools and equipment	9. Accruals and deferred income
4. <i>Payments on account and assets in course of construction</i>	F. Net current assets (liabilities)
III Investments	G. Total assets less current liabilities
1. <i>Shares in group companies</i>	H. Creditors: amounts falling due after more than one year
2. <i>Loans to group companies</i>	1. Debenture loans
3. <i>Shares in related companies</i>	2. Bank loans and overdrafts
4. <i>Loans to related companies</i>	3. Payments received on account
5. Other investments other than loans	4. Trade creditors
6. Other loans	5. Bills of exchange payable
7. <i>Own shares</i>	6. <i>Amounts owed to group companies</i>
C. Current assets	7. <i>Amounts owed to related companies</i>
I Stocks	8. Other creditors including taxation and social security
1. Raw materials and consumables	9. Accruals and deferred income
2. Work in progress	I. Provisions for liabilities and charges
3. Finished goods and goods for resale	1. Pensions and similar obligations
4. <i>Payments on account</i>	2. Taxation, including deferred taxation
II Debtors	3. Other provisions
1. Trade debtors	J. <i>Accruals and deferred income</i>
2. <i>Amounts owed by group companies</i>	K. Capital and reserves
3. <i>Amounts owed by related companies</i>	I Called up share capital
4. Other debtors	II Share premium account
5. Called up share capital not paid	III Revaluation reserve
6. Prepayments and accrued income	IV Other reserves
III Investments	1. Capital redemption reserve
1. <i>Shares in group companies</i>	2. Reserve for own shares
2. <i>Own shares</i>	3. Reserves provided for by the articles of association
3. Other investments	4. Other reserves
IV Cash at bank and in hand	V Profit and loss account

This is shown in Figure 3, and is a vertical or statement form of the format in Figure 2. Member States are allowed to adopt one format or to permit companies to make the choice, as long as they are consistent. The 1981 Act does the latter, and presents the vertical form as 'Format 1', presumably on the grounds that it corresponds much more closely with previous UK practice for published accounts (at least those of large companies) (ICAEW, 1980). Format 1 contains broadly the same headings, sub-headings and sub-sub-headings as Format 2, except that current liabilities are shown separately and positioned so as to enable a calculation of net current assets and then assets net of current liabilities.

Secondly, there are several ways in which flexibility is allowed. The *AktG* in S151 permits (i) different classifications for particular trades, (ii) extra detail to be added, and (iii) empty headings to be omitted. The Directive contains these provisions, and also allows Arabic number headings to be combined where the amounts are separately immaterial or where this would lead to greater clarity.¹¹ The 1981 Act includes these provisions, and also notes that the letters and numerals preceding the headings need not be shown. This

¹¹In this latter case, the information must be shown by note (Article 4).

accords with continental practice, but is not actually stated in the *AktG* or the Directive.

Thirdly, extra flexibility exists within the Directive's and hence the Act's formats, which was not present in the *AktG*. This takes the form of several alternative presentations of particular items,¹² in addition to the deletions mentioned above (e.g. formation expenses). This compromising of the original inflexible German format leads to uneasy results. For example, if the option is taken to show all accruals under J (a Germanic position) within Figure 3 (the British-style format), the size of 'net current assets' can be artificially increased by the amount of the short-term accruals.

All these provisions and the formats themselves are contained in Part I of Schedule 1 of the 1981 Act. Rather confusingly, this Schedule, which also contains accounting principles and disclosure rules, became Schedule 8 of the 1948 Companies Act. Taking all the most Anglo-Saxon options, and assuming that certain items will be immaterial or may be removed to notes, might mean that the italicised items in Figure 3 will not appear in many British balance sheets. Naturally, the letters and numerals will also be omitted. Also, given that one is concerned with a consolidated balance sheet, further items have been italicised; but a heading would need to be inserted for 'minority interests'. The lack of references to, or suitable headings for, consolidation in the 1981 Act has already been mentioned.

Another feature which may require explanation for Anglo-Saxon accountants is the omission of proposed dividends (as current liabilities in the balance sheet, and as appropriations 'below the line' in the profit and loss account). Again, the explanation lies in the predominant, 'legalistic' continental view of proposed dividends as amounts not established at the balance sheet date because they require the later approval of the shareholders. The 1981 Companies Act specifically (in Part I, Sch. 1) requires companies to adjust the profit and loss account for this. There is no instruction to adjust the balance sheet. Thus, proposed dividends may be shown separately under creditors or may be included under some other heading.

Turning now to the profit and loss account, there is one format only in the *AktG* (S157), but four in each of the versions of the Directive and in the 1981 Act. The format in the *AktG* contains 32 headings, whereas the nearest to it in the Directive and the 1981 Act¹³ contains about 20 headings. These are statement formats, which combine together expenses and revenues by their financial accounting nature; for example, all salaries to-

gether and all depreciation together (see Figure 4). This Germanic format might also be said to be production-oriented; it compares input with output (not sales with cost of sales), which is perhaps more the view of a business economist than of an accountant. Thus, the turnover is adjusted for changes in stocks and for use in the construction of fixed assets. The effect is reminiscent of a value added statement, and might seem attractive to some users as a compromise between that and a traditional profit and loss account.

The alternative in the Directive which will probably be most popular in the UK is presented in the 1981 Act as Format 1 (see Figure 5). This is also a vertical statement format and is identical to Format 2 from line 7, but it is sales-oriented and it combines expenses by stage of production. This format involves the disclosure of cost of sales and gross profit, whereas Format 2 does not, because of lack of information about how much wages, depreciation, etc to include in cost of sales. Some UK companies thus prefer Format 2.

The remaining two formats in the Directive and the Act are two-sided versions of Format 1 and Format 2, with charges (i.e. *debits*) on the left and income (i.e. *credits*) on the right.

The provisions relating to flexibility are the same as for the balance sheet, and one might note that all the headings in Figure 4 are preceded by Arabic numbers. The Act requires the inclusion of items for dividends, movements on reserves and pre-tax profit. Other items, like 'minority's share of profit' may be added.

Overall, profit and loss accounts in the UK have become much more detailed, with the disclosure of more information about expenses. Such details have been normal in German accounts.

These provisions relating to formats apply for *all* companies to the statutory annual accounts as drawn up for shareholders and audited. Although the Directive allowed some exemptions here, there are no exemptions in the UK's 1981 Act from the requirements to send full audited accounts to shareholders. However, there are some exemptions from *publication* for smaller *private* companies, as will now be discussed.

2. Publication

A further innovation in British law is that the 1981 Act introduces reduced *publication* requirements by size of company. This only applies to private companies. All public companies and large private companies must send to the Registrar of Companies, who gives access to the public, the full accounts as drawn up and audited.

Differential publication requirements were a feature of British Acts until 1947.¹⁴ For example, the

¹²For example, in Figure 3, unpaid capital (A) and pre-payments (D) may be (and, in the UK, presumably will be) shown under debtors (C, II, 5 and 6).

¹³Article 20 in 1971 and 1974; Article 21 in 1978, and Format 2 of the 1981 Act.

¹⁴To a large extent the 1948 Act removed the differentiation between private and public companies. However, a special class of 'exempt private companies' survived until the 1967 Act.

Figure 4
Profit and Loss Account Format 2 (1981 Companies Act)

1. Turnover
2. Change in stocks of finished goods and work in progress
3. Own work capitalised
4. Other operating income
5. (a) Raw materials and consumables
 (b) Other external charges
6. Staff costs:
 (a) wages and salaries
 (b) social security costs
 (c) other pension costs
7. (a) Depreciation and other amounts written off tangible and intangible fixed assets
 (b) Exceptional amounts written off current assets
8. Other operating charges
9. Income from shares in group companies
10. Income from shares in related companies
11. Income from other fixed asset investments
12. Other interest receivable and similar income
13. Amounts written off investments
14. Interest payable and similar charges
15. Tax on profit or loss on ordinary activities
16. Profit or loss on ordinary activities after taxation
17. Extraordinary income
18. Extraordinary charges
19. Extraordinary profit or loss
20. Tax on extraordinary profit or loss
21. Other taxes not shown under the above items
22. Profit or loss for the financial year

1907 Act required disclosure of balance sheet information by public companies but not private companies; the 1928 Act required companies to circulate profit and loss accounts to shareholders

Figure 5
Profit and Loss Account Format 1
(1981 Companies Act)

1. Turnover
2. Cost of sales
3. Gross profit or loss
4. Distribution costs
5. Administrative expenses
6. Other operating income
7. Income from shares in group companies
8. Income from shares in related companies
9. Income from other fixed asset investments
10. Other interest receivable and similar income
11. Amounts written off investments
12. Interest payable and similar charges
13. Tax on profit or loss on ordinary activities
14. Profit or loss on ordinary activities after taxation
15. Extraordinary income
16. Extraordinary charges
17. Extraordinary profit or loss
18. Tax on extraordinary profit or loss
19. Other taxes not shown under the above items
20. Profit or loss for the financial year

but not to the Registrar (Edwards, 1981, part II). Nevertheless, the 1981 Act cannot sensibly be traced to these precedents, which are too distant and do not concern exemptions by *size* of company. However, publication requirements dependent upon size are commonplace in continental Europe. They are found in the *AktG* (S157), which exempts an unlisted company from showing the details making up gross profit in the profit and loss account, if the company's balance sheet total does not exceed DM 3m (or it is a family company not exceeding DM 10m). Also, such provisions are found in a later German law, the Publicity Law (*Publizitätsgesetz*) of 1969, which requires all legal entities to publish audited accounts, irrespective of their business form, if they are above two of three size criteria for two years (see Figure 6).

There are somewhat similar rules in the Netherlands, where *BVs* are exempted from the need to publish profit and loss accounts where they fall below the limits shown in Figure 6. Also, in France, listed companies with assets in excess of FF 10m have been obliged to publish annual and interim figures in the *Bulletin des annonces légales et obligatoires*.

The Directive allows various exemptions which may be traced to the above precedents.¹⁵ The 1981

¹⁵Articles 11, 12, 27, 44 and 47 of the 1978 Directive.

Figure 6
Publication Requirement Size Criteria

	Germany-1969 Publizitäts- gesetz*	Netherlands BVs	UK 1981 Act*	
			Small	Medium
Balance Sheet Total	DM.125m	Fl.8m	£0.7m	£2.8
Turnover	DM.250m		£1.4m	£5.75
No. of Employees	5000	100	50	250

*A company must fall below two out of the three limits.

Act does not take full advantage of these exemptions (SS5-11), but does allow small private companies (see Figure 6) not to publish profit and loss accounts and most notes, and to abridge the balance sheet by omitting the headings and amounts preceded by Arabic numbers. This is reminiscent of the rules for *BVs* in the Netherlands. Medium-sized private companies are allowed to combine the gross profit items in their *published* profit and loss accounts. This is reminiscent of S157 of the *AktG*.

3. Accounting 'Principles'

In the area of accounting 'principles' there are also major changes for British accounting in the 1981 Companies Act. There are three levels of 'principles' (the word used in the Act). The first, and 'vague', level consists of a strengthened re-affirmation of the requirement for accounts to present a true and fair view. The paramount nature of the principle is made much clearer in S1 of the 1981 Act, which revises S149 of the 1948 Act:

Subsection (2) above [the true and fair view] overrides the requirements of Schedule 8 to this Act and all other requirements of the Companies Acts 1948 to 1981 . . .

(b) if, owing to special circumstances . . . , compliance with any . . . requirement . . . would prevent . . . complying with that subsection . . . , the directors . . . shall depart from that requirement . . .

This principle was not contained in German Law, nor in the first draft of the fourth Directive. However, presumably as a result of pressure from the governments of the UK, Ireland and the Netherlands, the principle was inserted in the 1974 draft and became predominant in the final Directive. This process is illustrated in Figure 7. It should be noted that the UK parliament did not define the 'special circumstances' in S1 of the 1981 Act, as the Directive would have allowed. It will become clear below that the British accountancy profession intends to claim exemption from some detailed provisions on this ground.

The second level of principles has again been substantially affected by Anglo-Saxon accounting.

Four accounting conventions of a British accounting standard, SSAP 2 (ASC, 1971), are enshrined in Article 31 of the Directive and in Part II of Schedule 1 of the 1981 Act. The conventions are: going concern, consistency, prudence and accruals. The first and the last were missing from the first draft of the Directive. However, a fifth principle has been taken from German law, i.e. that assets and liabilities should be valued separately (for example, using the lower of cost and net realisable value) before being added together. More importantly, it is of course a fundamental change of philosophy to find fairly detailed accounting concepts imposed by statute in the UK. This change clearly results from the *AktG*, which enacted accounting principles, including three of the five in the 1981 Act.

The third level of principles is more detailed and involves the encroachment of statute into territory previously regarded as that of the profession. Here, the influence of the *AktG* on the new British legislation is again clear. In order to enable comparisons within and between industries, to perform sensible aggregations of companies' accounting figures, and to control the economy, it has seemed appropriate in several continental countries not just to establish uniform formats but to ensure that the items within them are uniformly valued and measured.

The following rules are found in the *AktG*, the Directive and the 1981 Companies Act (Schedule 1); the sources are noted in that order in brackets after each item:

- (i) Fixed assets shall be carried at purchase price or construction cost (S153; Art32; para. 18).
- (ii) Intangibles may only be shown as assets if acquired for valuable consideration (S153; Arts 9 and 10; para. 8, notes 2 and 3).
- (iii) Fixed assets with limited useful lives must be depreciated (S154; Art35; para. 18).
- (iv) The basic rule for valuing current assets is 'lower of cost or net realisable value' (S155; Art39; para. 23).
- (v) Current asset valuation may use FIFO, LIFO, or similar method (S155; Art40; para. 27).

Figure 7**'True and Fair' in the Fourth Directive**

- | | |
|----------------------------------|--|
| 1965 <i>Aktiengesetz</i> (S149): | 1. The annual financial statements shall conform to proper bookkeeping principles. They shall be clear and well set out and give as sure a view of the company's financial position and its operating results as is possible pursuant to the valuation provisions. |
| 1971 Draft (Art2): | 1. The annual accounts shall comprise the balance sheet, the profit and loss account and the notes on the accounts. These documents shall constitute a composite whole.
2. The annual accounts shall conform to the principles of regular and proper accounting.
3. They shall be drawn up clearly and, in the context of the provisions regarding the valuation of assets and liabilities and the lay-out of accounts, shall reflect as accurately as possible the company's assets, liabilities, financial position and results. |
| 1974 Draft (Art2): | 1. (as 1971 Draft).
2. The annual accounts shall give a true and fair view of the company's assets, liabilities, financial position and results.
3. They shall be drawn up clearly and in conformity with the provisions of this Directive. |
| 1978 Final (Art2): | 1. (as 1971 Draft).
2. They shall be drawn up clearly and in accordance with the provisions of this Directive.
3. The annual accounts shall give a true and fair view of the company's assets, liabilities, financial position and profit or loss.
4. Where the application of the provisions of this Directive would not be sufficient to give a true and fair view within the meaning of paragraph 3, additional information must be given.
5. Where in exceptional cases the application of a provision of this Directive is incompatible with the obligation laid down in paragraph 3, that provision must be departed from in order to give a true and fair view within the meaning of paragraph 3. Any such departure must be disclosed in the notes on the accounts together with an explanation of the reasons for it and a statement of its effect on the assets, liabilities, financial position and profit or loss. The Member States may define the exceptional cases in question and lay down the relevant special rules. |

Further rules, which are consistent with German practice, are:

- (vi) Research costs, preliminary expenses and expenses on issue of securities must not be capitalised (para. 3).
- (vii) Purchased goodwill (where capitalised) must be written off over its useful life (para. 21). This does not apply to goodwill on consolidation.

The above are merely examples of the detail to which the 1981 Act specifies valuation rules. The *content* of the rules is not out of character for British accounting, but their statutory nature is a fundamental change. However, there follow four examples of the way in which the character of traditional British accounting will probably overcome the new rules in particular cases:

- (a) In order to avoid writing off purchased goodwill through the profit and loss ac-

count [see (iii) and (vii) above], British companies will probably write off existing goodwill against reserves before preparing their first balance sheet under the Act. In future, they may ensure that goodwill is never capitalised and thus needs no depreciation. Incidentally, although goodwill on consolidation is not covered by the 1981 Act, the requirements to be introduced as a result of the seventh Directive will be similar.

- (b) The Act defines prudence as the inclusion only of 'profits realised' (Sch. 1, para. 12). This in itself seems more restrictive than the Directive, which refers to 'profits made' (Art31). However, after representations from the accountancy bodies, the Act included a note that 'realised' should be taken in the context of 'principles generally accepted' (Sch. 1, para. 90). Thus, for example, it will be acceptable to take a pro-

portion of profit on long-term contracts as they proceed (SSAP 9, ASC, 1975).

- (c) In direct contravention of (iii) above, it will still be possible for companies not to depreciate investment properties. Again an appeal to the overriding principle of 'true and fair' will be made, backed up by reference to SSAP 19, the standard which allows this (ASC, 1981). This standard was issued after the 1981 Act, and the ASC made specific reference to this.¹⁶
- (d) In the UK before the 1981 Act, LIFO was normally unacceptable for both financial accounting and taxation purposes (ASC, 1975, App. I, para. 12). The enactment of the provision which specifically allows LIFO will not necessarily alter this. The accounting standard remains in force, and the Accounting Standards Committee might reasonably hold that the Act is 'minimum' legislation which by no means stops the profession from narrowing down from what is legally available to what gives a true and fair view. (Tweedie, 1983; Hoffman and Arden, 1983.)

Nevertheless, the imposition of valuation rules by statute is not just important as a philosophical change; it will be very significant in practice in some areas. For example, the following practices, some of which were certainly found in the UK particularly among smaller companies, are made illegal:

- (a) capitalisation of certain costs, as in (vi) above;
- (b) failure to depreciate goodwill (when capitalised) or most buildings (in the latter case, some companies have previously put up with audit qualifications as a price of this) (Sch. 1, paras 18 and 21);
- (c) failure to use 'lower of cost and net realisable value' for stocks or (more frequently) current asset investments.

Another main area where the strictness of the *AktG* has been watered down concerns historical cost. Although the 1981 Act, like the 1980 Act, is written in the context of historical cost, there are provisions in the Directive (Art33) and the 1981 Act (Sch. 1, paras 29–34) which allow alternative rules to a strict Germanic interpretation of this. Departures from historical cost are allowed, ranging from *ad hoc* revaluations of fixed assets to full scale current cost accounting (CCA) as statutory accounts. Even the first draft of the Directive (before British entry to the EC) allowed for such departures, which would have been necessary to allow for the practice of many Dutch companies

(Arts 30 and 31). However, the effect is clearly to destroy the attempt to establish uniform accounting measurement rules.

Nevertheless, there is a fundamental change from the previous UK position, in which a company could present statutory CCA accounts without historical cost information. As part of the price for adopting (or having previously adopted) an alternative to 'Germanic Accounting' for any item, many disclosures are required by Schedule 1 of the 1981 Act.¹⁷ In effect, these would allow the reconstruction of historical cost accounts, which does represent a measure of harmonisation (as opposed to standardisation).

Disclosure

The fourth major area of accounting provisions in the 1981 Act is a series of disclosure requirements¹⁸ which are additional to those of the Companies Act 1948 to 1980. Many of them may be traced to the *AktG*.

Conclusion

During the twentieth century, until the 1980 Companies Act, British legislation relating to financial reporting has been fairly sparse and has moved forward in an evolutionary way, often following 'best practice'. The advent of the 1980 and 1981 Companies Acts brings about several changes. Some of these changes are revolutionary because their inspiration comes from outside the Anglo-Saxon world; the most obvious single source being the German *Aktiengesetz* of 1965. For example, introduction of a distinct label and minimum capital requirements for public companies, of compulsory formats and detailed measurement rules for financial reports, and of reduced publication requirements for smaller companies may be better understood by tracing their ancestry. There are some cases where the British accounting tradition may manage to side-step the detailed requirements of the new legislation, but even here the changed letter of the law may have an important influence in the longer run.

¹⁷The disclosures include: (i) the valuation basis used (para. 33), (ii) the comparable historical cost amount or the difference therefrom (para. 33), (iii) the comparable accumulated depreciation under historical cost or the difference (para. 33), (iv) the revaluation reserve relating to all departures (para. 34), (v) a note of valuation revisions due to adoption of alternative methods in the year (para. 42), (vi) the year of valuation (para. 43), (vii) for assets revalued in the year, the names or qualifications of the valuers (para. 43).

¹⁸These are to be found in part III of Schedule 1 of the 1981 Act, which replaced Schedule 8 of the 1948 Act. Article 32 of the Directive contains many of them. There is one repeal, in that S16 of the 1981 Act removes the requirement of S20 of the 1967 Act to disclose exports.

¹⁶Paras. 9–13 of the supplementary statement to SSAP 19.

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Attributability and Distributability of Profit to Shareholders

Robert F. Sharp and Eric E. Spires*

Current cost accounting as prescribed by SSAP 16 is intended to represent profits from two different viewpoints:

The current cost operating profit is the surplus arising from the ordinary activities of the business in the period after allowing for the impact of price changes on the funds needed to continue the existing business and maintain its operating capability, whether financed by share capital or borrowing.

The current cost profit attributable to shareholders is the surplus for the period after allowing for the impact of price changes on the funds needed to maintain their (shareholders') proportion of the operating capability. (ASC, 1980a, paras. 40, 41.)

It is the shareholders' view of profit that is analysed in this paper.

While much has been written about the relevance of the capital maintenance concept underlying the latter view of profit [e.g., Egginton, 1980; Forker, 1980, 1982; Revsine, 1981; MacDonald, 1982], little has been written about whether the promulgated measurement procedures are reliable for measuring the surplus when the shareholders' portion of operating capability has been maintained. This paper addresses the latter issue by comparing the outputs of the required procedures with the conceptual intent of those procedures. Focussing on the gearing and depreciation adjustments, we find that reliability can be increased by using procedures that are less complex than the present requirements of SSAP 16.

Our overall conclusion is that current cost accounting can be made simpler and more acceptable conceptually if measurement procedures are more closely related to the concept that they are intended to represent. We begin by discussing the conceptual intent of profit attributable to shareholders,

accepting that intent as a criterion even though we are aware of its limitations for some purposes. We then show that this conceptual criterion is misrepresented when the present procedures, especially the gearing adjustment, are used to measure profit attributable to shareholders. This is demonstrated with a numerical example and with computer simulation. Those misrepresentations are sequentially traced to four procedural deficiencies, which we show can be eliminated by modifying the gearing and depreciation adjustments. We then demonstrate both the reliability and the simplicity of the modified adjustments. The analysis does not cover the cost of sales and monetary working capital adjustments, but it is suggested that a similar analysis of those adjustments might be worthwhile.

Conceptual intent of profit attributable to shareholders

The conceptual intent of profit attributable to shareholders (PAS) can be determined by reference to its capital 'benchmark'. As discussed by Egginton [1980] and Forker [1980], the neutral benchmark from which to measure profit during a period is capital at the beginning of the period, with each concept of capital implying a distinct concept of profit. In the case of PAS, the capital benchmark is the shareholders' proportion of the firm's opening operating capability [ASC, 1980a, para. 6], which comprises physical assets plus monetary working capital [para. 3].

The primary import of this concept can be demonstrated by a simple example in which a firm has the following current cost balance sheets.

	<i>Opening</i>	<i>Closing</i>
Net operating assets	100	110
Net borrowing	(40)	(40)
Shareholders' interest	<u>60</u>	<u>70</u>

The company's closing assets represent the same operating capability as its opening assets (i.e., the prices of the assets increased by 10%). The shareholders' surplus is 4 because their opening propor-

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tion of operating capability could be maintained with a closing shareholders' interest of only 66 ($66/110 = 60/100 = 60\%$). According to Godley and Cripps [1975], this firm could borrow 4 and distribute it to owners while maintaining their 60% share of the firm's operating capability. This *conceptually* distributable amount is referred to below as PDO (profit distributable to owners) to distinguish it from the accounting measurement (PAS).

The previous wording does not imply that PDO is always the most *prudent* amount to distribute [Egginton, 1980]. It is possible that creditors would no longer wish to finance 40%, in which case nothing could be distributed without liquidating some of the operating assets. Alternatively, it might be prudent to retain profits for the purpose of expanding operating capability, perhaps with the same proportion subsequently financed by borrowing. Measuring the amount distributable relative to a given benchmark does not prejudice the amount that should be distributed. In case of nondistribution for either of the latter reasons, the owners' share of operating assets will have in-

creased from 60 to 63.6% ($70/110$), an increase that is worth 4 monetary units at current prices. Thus PDO is the shareholders' surplus whether it is distributed or not.¹

To facilitate the following analysis, PDO *is* distributed. Regarding this condition, the ASC says,

a full distribution of the current cost profit attributable to shareholders may make it necessary to arrange additional finance (equal to the gearing adjustment) to avoid an erosion of the operating capability of the business. [1980a, para. 23.]

If the ASC's procedures for measuring PAS are reliable, then PAS would equal the actual distribution while maintaining the owners' share of the firm's operating capability. If not, the ASC's procedures may need to be modified.

Comparing representations with intentions

Four procedural problems of PAS were discovered through the use of computer simulation, a technique suggested by Arnold and Hope [1975]. A drawback of using the same technique to demonstrate the problems, however, is that it places a heavy demand on the reader's faith in the credibility of the simulation, especially when the results are produced by complex interactions among the individual procedural problems. In an effort to minimise this demand on the reader, the individual procedural problems are addressed sequentially

¹We accept the conceptual intent of PAS without judging its merits relative to other concepts of profit. Forker [1980] prefers the benchmark to be defined as the general purchasing power of the opening shareholders' interest. Revsine [1981] accepts the physical nature of operating capability but defines distributors to include creditors as well as owners. Conflicting interpretations of the proprietary focus of PAS are given by Kennedy [1978] and Egginton [1980]. While these issues are important, they are set aside in this paper to focus on a different issue: whether the procedural consequences of PAS are consistent with the conceptual goal stated in SSAP 16.

Table 1
Firm A—selected financial information

	<i>Current Cost Balance Sheets</i>			
	<i>12/31/X0</i>	<i>12/31/X1</i>	<i>12/31/X2</i>	<i>12/31/X3</i>
Asset	9000	9900	10890	11979
Accumulated depreciation		(3300)	(7260)	
Operating assets	9000	6600	3630	11979
Net borrowing	(3600)	(660)	2904	(4792)
Shareholders' interest	<u>5400</u>	<u>5940</u>	<u>6534</u>	<u>7187</u>
Gearing proportion*	40%	10%	-80%	40%
*Net borrowing/operating assets				
	<i>Cash Flow Summaries</i>			
	<i>19X1</i>	<i>19X2</i>	<i>19X3</i>	
Rent	5000	5500	6050	
Repairs and maintenance	(1232)	(1488)	(1782)	
Interest	(504)	(92)	407	
Borrowing (payment)	(2940)	(660)	4792	
Monetary (investment) withdrawal		(2904)	2904	
Purchase of asset			(11979)	
Dividend = PDO	<u>324</u>	<u>356</u>	<u>392</u>	
Return on shareholders' interest	6%	6%	6%	

after providing a numerical example to serve as a cross-check on the validity of the simulation results. The latter results are shown by plotting time series of PDO and PAS; time series whose general configurations can be confirmed by reference to the simpler example.

First consider 'Firm A', with the following characteristics:

1. The company purchases a single asset at the end of 19X0 for 9000, which is financed 40% by borrowing.
2. The asset has a three-year life with no salvage value, and depreciation is computed on the straight-line basis.
3. All transactions are made in cash.
4. The company rents the asset to its customers.
5. There is no taxation.
6. Asset costs increase at a 10% annual rate.
7. The annual interest rate is 14%.
8. The company distributes the PDO each year.

Table I shows the current cost balance sheets and cash flow summaries for the first three years of Firm A. To facilitate comparisons between PAS and PDO, repairs and maintenance costs were calculated so that Firm A's return on owners' equity (ROE) is a constant 6%. Having a constant ROE makes the analysis somewhat easier to follow, but this condition does not affect the general nature of the conclusions. It should be noted that exact maintenance of shareholders' interest does not imply that the gearing proportion remains constant from year to year. As shown in Table 1, the gearing proportion for Firm A ranges from +40% to -80%.

PDO is equal to dividends in Table 1 because they allow the owners to maintain their 60% share of the original operating capability after dividends are distributed each year:

Shareholders' interest after dividends
Current cost of new operating asset
Shareholders' interest as proportion
of original operating capability

$$\begin{aligned}
 & \pm \text{Monetary working capital adjustment (MWCA)} \\
 & = \text{Current cost operating profit} \\
 & \pm \text{Interest} \\
 & - \text{Taxes} \\
 & + \text{Gearing adjustment (GA)} \\
 & = \text{PAS}
 \end{aligned}$$

The simple company being analysed has no inventory, therefore there is no need for the COSA. Similarly, since all transactions are in cash, the MWCA is zero. The latter condition allows the analysis to focus on the gearing adjustment without any complications that could arise from the MWCA.

Table 2 shows the PAS calculations for Firm A. The top part presents the ASC's recommended calculations assuming that the company uses historical cost accounting as its primary system. The depreciation adjustment (DA) is the difference between the average current cost and the historical cost of the asset multiplied by the depreciation rate. In 19X2, for example,

$$DA = (1/3)[(9900 + 10890)/2 - 9000] = 465.$$

The lower part of the table presents a direct method of calculating PAS that would be allowable by SSAP 16 [ASC, 1980a, para. 28] for companies with primary current cost accounting systems. The gearing adjustment (GA) is discussed in detail below.

PAS understates PDO when the asset is relatively new and overstates it as the asset becomes older. This pattern is indicated in Table 3 for Firm A, and the plots in Table 4 indicate the same pattern for Firm B, which has several different characteristics. Firm B is similar to Firm A in that there is no stock, that all transactions are made in

	<u>12/31/X0</u>	<u>12/31/X1</u>	<u>12/31/X2</u>	<u>12/31/X3</u>
Shareholders' interest after dividends	5400	5940	6534	7187
Current cost of new operating asset	9000	9900	10890	11979
Shareholders' interest as proportion of original operating capability	60%	60%	60%	60%

Since shareholders' interest is being maintained, the dividends distributed by Firm A must be equal to PDO.

Calculation of PAS

The ASC [1980a] recommends calculating PAS as follows (assuming rising prices):

- Historical cost profit before interest and taxes
- Current cost depreciation adjustment (DA)
- Current cost of sales adjustment (COSA)

cash, that there is no taxation, that the initial gearing proportion is 40%, and that PDO is distributed each year. Firm B differs from Firm A in that Firm B's equipment has a ten year life, costs increase at 6%, and ROE is constant at 4%. In spite of these differences, PAS understates Firm B's PDO in early years and overstates it in later years of each asset's life. The pattern appears three times for Firm B because three assets are used during the 30 year simulation. Cumulative PAS overstates cumulative PDO for both firms.

Table 2
Firm A—calculation of PAS

<i>Indirect Method</i>			
	<i>19X1</i>	<i>19X2</i>	<i>19X3</i>
Rent	5000	5500	6050
Repairs and maintenance	(1232)	(1488)	(1782)
Historical cost depreciation	(3000)	(3000)	(3000)
Historical cost profit before interest	768	1012	1268
Current cost depreciation and adjustment (DA)	(150)	(465)	(812)
Current cost operating profit	618	547	456
Interest	(504)	(92)	407
Gearing adjustment (GA)	58	45	
Profit attributable to shareholders (PAS)	<u>172</u>	<u>500</u>	<u>863</u>
<i>Direct Method</i>			
Rent	5000	5500	6050
Repairs and maintenance	(1232)	(1488)	(1782)
Depreciation	(3150)	(3465)	(3812)
Current cost operating profit	618	547	456
Interest	(504)	(92)	407
Gearing adjustment	58	45	
Profit attributable to shareholders	<u>172</u>	<u>500</u>	<u>863</u>

Table 3
Firm A—Summary of various profit calculations

	<i>19X1</i>	<i>19X2</i>	<i>19X3</i>
PDO:			
Amount	324	356	392
ROE	6%	6%	6%
PAS:			
Amount	172	500	863
ROE	3.2%	8.4%	13.2%
<i>Modifications of PAS*</i>			
PAS(1):			
Amount	172	500	267
ROE	3.2%	8.4%	4.1%
PAS(2):			
Amount	463	518	597
ROE	8.6%	8.7%	9.1%
PAS(3):			
Amount	474	521	573
ROE	8.8%	8.8%	8.8%
PAS(4):			
Amount	324	356	392
ROE	6%	6%	6%

***Modifications:**

PAS(1) = PAS with symmetrical application of gearing adjustment.

PAS(2) = PAS(1) with modified cost basis for gearing adjustment.

PAS(3) = PAS(2) with opening gearing proportion.

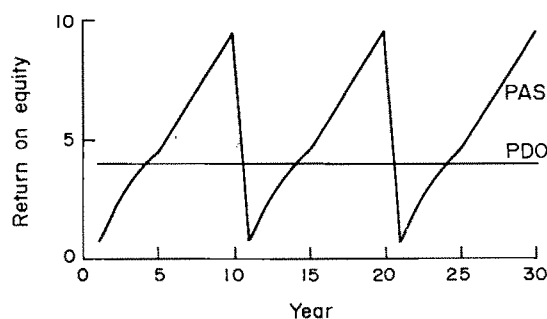
PAS(4) = PAS(3) with depreciation based on closing cost.

Four deficiencies in the PAS measurement procedures

The pattern shown for PAS results from the interaction of four individual problems contained in the SSAP 16 procedures. Details of those procedures and the recommended modifications are sum-

²The Guidance Notes to SSAP 16 say that it would also be acceptable to base depreciation on closing cost [1980b, para. 47], which apparently is consistent with our fourth recommendation. While practice may be to use closing cost, the use of average cost is not discouraged by the ASC. We use average cost to illustrate its potential problems and to show that these problems can be overcome by using the simpler alternative preferred in practice.

Table 4
Firm B—plots of PDO and PAS



marised as follows:

Procedure	SSAP 16	Recommended
1. Application of GA	when net borrowing is positive	always
2. Basis of GA:		
a. cost increase	average minus historical cost	closing minus opening cost
b. proportion of cost increase	fraction used currently average ²	fraction unused at beginning opening closing
3. Gearing proportion used in GA		
4. Cost for calculating depreciation		

Each recommendation is explained below in terms of the problem it is intended to remedy.

Asymmetric Application. The first recommendation is to apply the gearing adjustment unconditionally, i.e., without regard to the sign of net borrowing. As Forker notes [1980, pp. 394-395], it is logically inconsistent to apply a gearing adjustment when net borrowing is positive but not when

the gearing adjustment is based on the DA, which is the difference between current cost depreciation and historical cost depreciation. As mentioned above, the DA is also equal to the depreciation rate times the difference between the average current cost and the historical cost of the fixed asset. Consider how this basis differs from the recommended basis for Firm A:

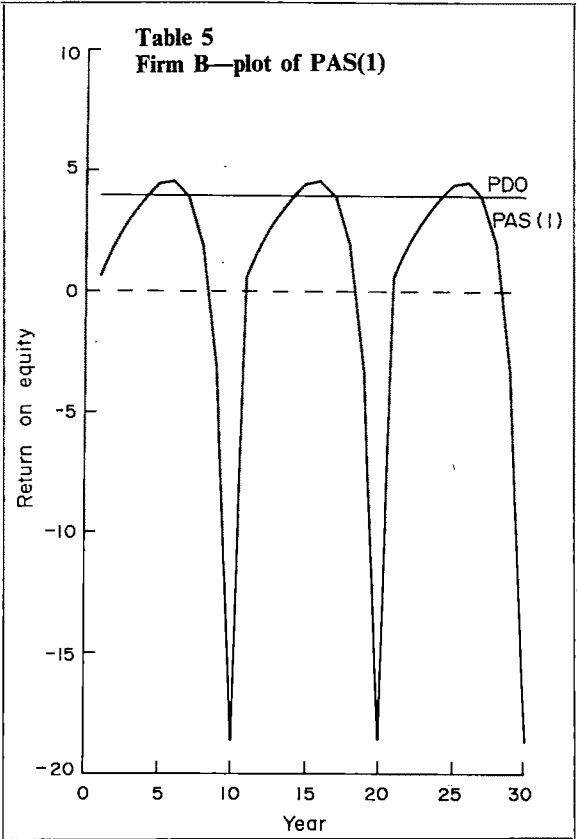
	19X1	19X2	19X3
SSAP 16	$\frac{1}{3}(450) = 150$	$\frac{1}{3}(1395) = 465$	$\frac{1}{3}(2435) = 812$
Recommended	$\frac{3}{3}(900) = 900$	$\frac{2}{3}(900) = 900$	$\frac{1}{3}(1089) = 363$

it is negative (when monetary investments exceed borrowing). If there is a gain from borrowing when costs are rising, then there must be a loss from lending under the same condition.

By itself, however, this first recommendation is not sufficient to make PAS a reliable estimate of PDO. PAS(1) is PAS calculated after eliminating the problem of asymmetric application³ with regard to the sign of net borrowing. Table 3 indicates that PAS(1) produces an underestimate of PDO in 19X3, rather than the overestimate produced by PAS with the asymmetry problem. A more complete pattern is provided by the plot of PAS(1) in Table 5 for Firm B. For both firms, PAS(1) produces a pattern of understatement, then overstatement, then understatement of PDO as the asset ages.

Dependence on Historical Cost Accounting. The pattern of PAS(1) is caused by a different sort of inconsistency: a current cost adjustment that depends on historical cost accounting. In SSAP 16,

³Our recommendation differs from the approach put forth in the Hyde guidelines [ASC, 1977, paras. 16-18]. The Hyde adjustment for negative gearing is inconsistent with its adjustment for positive gearing. The adjustments we recommend are completely symmetrical in that they involve the same type of calculation for negative and positive gearing. Our calculations are illustrated in the text for entry (C).



The recommended basis is the annual increase in the cost of maintaining opening operating capability, which is consistent with the conceptual intent of SSAP 16.

Using the DA as the basis is conceptually inconsistent for at least two reasons. First, the DA uses the fraction consumed during the year rather than the unused fraction available at the beginning of the year. This makes the gearing adjustment too low when the asset is relatively new, thus underestimating PDO. Second, as the asset gets older, the difference between current cost and historical cost depreciation becomes much larger than the annual increase in the cost of a new asset. The latter dependence makes the gearing adjustment too high, either positively or negatively for PAS(1), depending on the sign of net borrowing. Since net borrowing becomes negative for both firms soon after the DA exceeds the annual increase in cost, the latter dependence has no effect on PAS but causes PAS(1) to underestimate PDO when the asset is relatively old. The effect on PAS(1) is more pronounced for Firm B because a 6% annual increase for ten years is relatively larger than a 10% increase for three years.

Applying the second recommendation eliminates the understatements and reduces the variability of PAS. This can be determined from PAS(2) which incorporates symmetrical application as well as the recommended cost basis. PAS(2) is calculated for Firm A in Table 3 and plotted for Firm B in Table 6. In both tables, PAS(2) produces a pattern of increasing overstatement, peaking in the year of replacement.

Average Gearing Proportion. The variable pattern of PAS(2) results from using an average gearing proportion. PAS, PAS(1) and PAS(2) are calculated using a weighted average of net borrowing, which the ASC recommends when substantial changes in net borrowing occur during the period [1980b, para. 112a]. Since all changes in net borrowing for Firms A and B occur at the end of the period, the weighted average of net borrowing (L) is assumed to be the same as the opening balance.

Average shareholders' interest (S) is calculated as a simple average of the opening and closing balances, as recommended by the ASC [1980b, para. 112b]. The resulting average gearing proportion for Firm A in 19X1 is:

$$L/(L + S) = 3600/[3600 + (5400 + 5940)/2] = 0.388$$

Proportions for the other years are calculated in a similar fashion. The variability of PAS(2) can be explained by comparing these average gearing proportions with the recommended proportions:

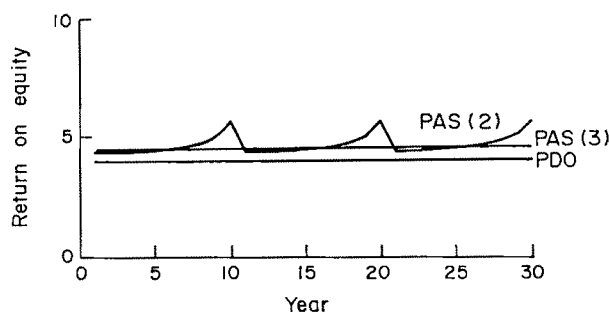
	12/31/X1	12/31/X2	12/31/X3
<i>Average (SSAP 16)</i>	0.388	0.096	0.734
<i>Opening (recommended)</i>	0.400	0.100	0.800

Proportions based on opening balances are recommended because the conceptual benchmark for PAS is opening net operating capability. The numerator (L) is the same under both methods, but the denominators are different because average shareholders' interest exceeds opening shareholders' interest. With a higher denominator, the average proportion is always closer to zero than the opening proportion. The result is a gearing adjustment that is too low when net borrowing is positive and too high (less negative) when net borrowing is negative, which explains why PAS(2) has a variable pattern.

Use of the opening gearing proportion eliminates the artificial variability. PAS(3) incorporates this third recommendation as well as the first two recommendations. As indicated in Tables 3 and 6, the pattern of PAS(3) is a consistent overstatement of PDO for both firms.

Average Cost for Depreciation. The pattern of PAS(3) results entirely from the use of average current cost in the calculation of depreciation expense. The Guidance Notes to SSAP 16 also allow depreciation expense to be based on closing cost (1980b, para. 47], but the wording implies a

Table 6
Firm B—plots of PAS(2) and PAS(3)



preference for average cost. The general procedure illustrated in the Guidance Notes [1980b, appendix (vii)] is to restate opening and closing fixed asset balances in terms of average current costs before calculating depreciation. The recommended procedure is to restate balances to closing cost. This recommendation is consistent with the previously recommended cost basis for the gearing adjustment, which is in turn consistent with the conceptual benchmark of opening net operating capability.

Applying this fourth recommendation to PAS(3) produces PAS(4) = PDO. Eliminating the need for a 'backlog' reconciling adjustment (from average to closing cost), this recommendation is also consistent with the reasoning of the Sandilands Committee [1975] and of Sale and Scapens [1978]. It should be noted that the overstatement caused by using average current costs is constant for both firms only because prices are rising at a constant rate. If prices were to rise at a variable rate, the differences between PAS(3) and PDO would be variable. Whether the rate is constant or variable, however, the differences can be eliminated by the fourth recommendation.

Greater reliability with less complexity

The complexity of these problems may tend to obscure the relative simplicity of the recommended modifications. If 'profit attributable to shareholders' is reliably to measure the 'surplus for the

period after allowing for the impact of price changes on the funds needed to maintain the shareholders' proportion of the operating capability' [ASC, 1980a, para. 6], we recommend modification of four procedures promulgated in SSAP 16:

1. make a gearing adjustment regardless of the sign of net borrowing (vs. only when it is positive);
2. use the annual increase in cost of maintaining beginning operating capability (vs. the DA) as the cost basis for the gearing adjustment;
3. use the beginning gearing proportion (vs. an average) for the gearing adjustment; and
4. calculate depreciation by restating asset balances to ending costs (vs. average costs).

The first recommendation calls for procedural symmetry. Each of the latter recommendations calls for simpler calculations than those promulgated by SSAP 16.

Both simplicity and reliability can be illustrated with the journal entries implied by these recommendations. Assuming that Firm A has an operational current cost accounting system, it would have made the entries in Table 7 (with credits in parentheses).

The results of these adjustments are shown in Table 8, where the modified PAS is now the same as PDO. Notice that the adjustment for increased cost of maintaining the owners' share of operating capability (taken to current cost reserve) increases by 10% each year. This result satisfies Agrawal's

Table 7
Firm A—Journal Entries

	<u>19X1</u>	<u>19X2</u>	<u>19X3</u>
(A) To record increase in cost of opening operating capability (recommendation 2):			
Fixed asset*	900	990	1089
Accumulated depreciation*	—	(330)	(726)
Increased cost of maintaining operating capability *10% of opening balance (from Table 1)	(900)	(660)	(363)
(B) To record depreciation (recommendation 4):			
Depreciation expense**	3300	3630	3993
Accumulated depreciation** **1/3 of fixed asset balance after adjustment (A)	(3300)	(3630)	(3993)
(C) To record gearing (recommendations 3 and 1):			
Increased cost of maintaining operating capability	900	660	363
Gearing adjustment***	(360)	(66)	290
Increased cost of maintaining shareholders' proportion of operating capability	(540)	(594)	(653)
***beginning gearing proportion × increased cost from adjustment (A):			
19X1: 0.40 (900) = 360			
19X2: 0.10 (660) = 66			
19X3: -0.80 (363) = -290			



Table 8
Firm A—Recommended calculation of PAS

	19X1	19X2	19X3
Rent	5000	5500	6050
Repairs and maintenance	(1232)	(1488)	(1782)
Depreciation	(3300)	(3630)	(3993)
Current cost operating profit	468	382	275
Interest	(504)	(92)	407
Gearing adjustment	360	66	(290)
Profit attributable to shareholders (= PDO)	<u>324</u>	<u>356</u>	<u>392</u>

criterion: 'a perfect correlation with the price-rise affecting the entity' [1977, p. 790]. Notice also that the adjustment equals 60% of the annual increase in asset cost. The latter result is consistent with the objectives of Godley and Cripps [1975] and SSAP 16 for representing the effect of increased costs on the shareholders' interest in the firm's operating capability.

It could be important that these recommended procedures are simpler than those of SSAP 16. Westwick [1980] says that simplicity can increase the acceptability of accounting standards. If simplicity can be coupled with conceptual soundness, as we have attempted to do in this paper, the result should be accounting standards that are more readily understandable to users and to the accountants who must apply those standards.

Implications for further research

The results of the preceding analysis suggest that other accounting procedures could be improved and perhaps simplified by comparing their outputs with the concept those procedures are intended to represent. For example, the finding that averages are inappropriate for the gearing adjustment suggests potential problems for the COSA and the MWCA, both of which currently involve averaging procedures. The results of such analyses might further suggest weaknesses in other procedures not addressed in this paper.

May and Sundem [1976] recommend that such analyses should *precede* empirical research that deals with users and correlations of reported numbers. Inferences about reported numbers cannot indicate potential relevance of accounting concepts unless those numbers closely approximate the concepts they are intended to represent. For this

reason, we suggest that procedural analyses could substantially increase the validity of subsequent empirical research.

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Needs of Loan Officers for Accounting Information from Large versus Small Companies*

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Should small private companies be required to use the same accounting and reporting standards as large public companies? In the USA, this is one of the most controversial questions in the financial community today, and in the words of a recent discussion paper issued by the American Institute of Certified Public Accountants (AICPA), 'an ultimate solution must consider whether and to what extent the needs of users of financial statements of small or closely held businesses differ significantly from the needs of users of the financial statements of large public companies'.¹

The objective of the empirical study reported in this paper is to compare the informational needs of bank loan officers who make lending decisions that involve large public companies with the informational needs of loan officers who make lending decisions that involve small private companies. The study focuses on bankers because they constitute one of the major groups that use the general purpose financial statements of both large and small companies. The study is based on an analysis of data obtained from 230 loan officers located throughout the United States.

Background and rationale for the study

Currently, companies in the USA must present their general purpose financial statements in accordance with a single set of generally accepted accounting principles (GAAP). These principles apply to all businesses, regardless of size or ownership characteristics. In recent years, however, many people have argued that GAAP have become too numerous and complex and that an accounting standards overload exists.² An accounting stan-

dards overload has a negative impact on all companies, but it especially hurts smaller companies because these companies are less able to afford the costs of complying with the standards. Prominent examples of accounting standards in the USA that are claimed to hurt smaller companies are those that require lease capitalisation and interperiod tax allocation. It is argued that these standards are too technical, too costly to implement, and produce little or no useful information for users.³

The FASB is highly concerned about the impact of its standards on smaller companies and has already taken actions designed to reduce the financial reporting burden of smaller companies. In April 1978, for example, the FASB declared that nonpublic enterprises are no longer required to report earnings per share and segment information. In 1979, the Board made its inflation accounting requirements applicable only to very large companies. These actions indicate that the FASB recognises that users of the financial statements of smaller companies may not need the same types of accounting information as do users of the financial statements of larger companies.

One solution that has been suggested for the problem of accounting standards overload is the creation of two sets of GAAP, one set for larger companies (commonly called 'Big GAAP') and another set for smaller companies (commonly called 'Little GAAP').⁴ The major arguments for two sets of GAAP are: (1) Existing GAAP are designed primarily for users of the financial statements of public entities and are not designed to provide the information needed by the primary users of financial statements of small or nonpublic companies, (2) existing GAAP are often the results of attempts to deal with complex transactions that seldom apply to smaller companies, (3) existing GAAP are too costly for smaller companies to apply, and (4) the FASB should concentrate its

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¹American Institute of Certified Public Accountants (1981), p. 5.

²American Institute of Certified Public Accountants (1981), pp. 3-10.

³Financial Accounting Standards Board (1981), p. 38.

⁴American Institute of Certified Public Accountants (1981), pp. 11-12.

limited resources on financial reporting for public entities.⁵

On the other hand, many individuals and organisations (such as Robert Morris Associates, a national organisation of bank loan officers in the USA), oppose two sets of GAAP. These opponents argue that if two sets of GAAP existed, one set would inevitably have second class status. Moreover, the existence of two sets of GAAP would be likely to confuse users. Finally, opponents point out that no empirical evidence has been offered to indicate that user informational needs differ depending on the size or ownership characteristics of the reporting company.⁶

A search of the literature has revealed no empirical studies that have systematically compared the informational needs of those who use the financial statements of large public companies with the needs of those who use the financial statements of small private companies. Although several studies have dealt with user needs in general⁷ and one study has dealt specifically with user needs in relation to closely-held companies,⁸ no empirical studies have yet been published that address the question of whether and to what extent the informational needs of users differ depending on the size or ownership characteristics of the reporting company. The current study was therefore undertaken to provide initial empirical evidence in this area.

Research design

The Questionnaire

We used two versions of a pretested questionnaire to gather data for the study. The two versions were identical in all respects except that in one version we established a large company context while in the other we established a small company context. The 'large company' questionnaire requested respondents to make a decision involving a large public industrial company, defined in the questionnaire instructions as one whose operations are relatively large, usually with total revenues greater than \$125 million, and whose securities are traded in a public market.⁹ In contrast, the 'small company' questionnaire called for a decision involving a small private industrial company, defined as one whose operations are relatively small, usually with total revenues of less than \$5 million, and

whose securities are not traded in a public market.¹⁰

Both versions of the questionnaire included a carefully worded page of instructions and a collection of forty specific items of accounting information. (The forty information items appear in Table 1, which we present later in the article.) In selecting information items to include in the questionnaire, we attempted to provide a reasonable cross-section of accounting information items that would apply to both large and small companies. Moreover, we included many information items that proponents of two sets of GAAP have argued should not be required of smaller companies. Of the forty information items included in the questionnaire, twenty-five items pertain to conventional GAAP, five items pertain to financial forecasts, five items pertain to constant dollar accounting (that is, accounting information that has been adjusted for general price-level changes), and five items pertain to current cost accounting (that is, accounting information that reflects specific price changes). Half (twenty) of the forty items have been suggested in the literature as being inappropriate to require of smaller companies.

Next to each of the forty information items was a five-point scale that the respondents were asked to use in evaluating the importance of each item. The scale was constructed as follows:

- 0 = Not important
- 1 = Slightly important
- 2 = Moderately important
- 3 = Very important
- 4 = Extremely important

The respondents were instructed to evaluate each information item independently within a context of making a term loan decision (maturity between three and five years). Respondents also were reminded that information has a cost; therefore, if a loan officer asks a company to disclose information that is too costly to provide, the company may seek other lending sources. Finally, the respondents were asked to assume that:

1. They were dealing with a typical *new customer* in a context of relatively *tight money*.
2. The customer was applying for a term loan that is significant in dollar amount but considerably less than the respondent's legal lending limit.
3. The *dollar amounts* of all questionnaire items were *significant*.
4. Each questionnaire item pertained to the company's *most recent fiscal year*, unless otherwise stated in the questionnaire.

The Respondents

During the first quarter of 1982, we contacted 400 chief commercial loan officers via first class

⁵American Institute of Certified Public Accountants (1981), p. 11.

⁶American Institute of Certified Public Accountants (1981), pp. 11-12.

⁷See Chandra (1974), Lee and Tweedie (1975), Benjamin and Stanga (1977), and Anderson (1981).

⁸See Falk, Gobdel and Naus (1976).

⁹We based our definition of a large public company on Financial Accounting Standards Board (1981), p. 4 and on the fact that sales of approximately \$125 million or greater were necessary to be included in the 1981 *Fortune* 1,000.

¹⁰We based our definition of a small private company on Financial Accounting Standards Board (1981), pp. 3-4.

mail. Each loan officer was mailed a packet containing (1) a letter explaining the purpose of the study and requesting participation, (2) a copy of the instructions and questionnaire, and (3) a postage-paid, self-addressed return envelope. Three weeks after the initial mailing, we mailed a second request letter and another copy of the questionnaire to those individuals from whom completed questionnaires had not been received.

while pretesting the questionnaire; the group consisted of the 200 chief commercial loan officers who represent each of the US banks that are ranked in size from 1,001 through 1,200.¹³ A copy of the 'small company' version of the questionnaire was sent to each loan officer in the 'smaller bank' group.

The number of responses and response rate for each survey group are summarised below:

Survey Group	Questionnaires Mailed	Responses Received			Overall Response Rate
		First Mailing	Second Mailing	Total	
'Larger bank' group	200	76	35	111	55.5%
'Smaller bank' group	200	78	41	119	59.5%
Total	400	154	76	230	57.5%

A stratified sample of 400 loan officers was selected so that two equal-size groups were formed. We shall refer to these groups as the 'larger bank' group and the 'smaller bank' group.¹¹ The 'larger bank' group comprised the chief commercial loan officers from each of the 200 largest banks in the United States.¹² Each loan officer in the 'larger bank' group was mailed a copy of the 'large company' version of the questionnaire. Our objective in establishing the 'larger bank' group was to select a group of loan officers who would likely be knowledgeable users of accounting information and who would tend to be familiar with the decision processes involved in making loans to large companies.

In selecting a 'smaller bank' group, our goal was to establish a sample of loan officers who would likely be familiar with the decision processes involved in making loans to small companies and who would likely be familiar with and regularly use various types of accounting information when making their lending decisions. We decided not to survey loan officers at very small banks because many of these individuals are known to be more heavily influenced in their lending decisions by a personal knowledge of the loan applicant rather than by the applicant's accounting information. We therefore felt that loan officers at very small banks might not be sufficiently familiar with some of the information items included in the questionnaire. The 'smaller bank' group we selected was based in part on advice received from loan officers

Test for Nonresponse Bias

We believe that the response rates reported above are reasonably high given the nature of the study. Nevertheless, whenever a questionnaire response rate is substantially less than 100 percent, nonresponse bias may present a problem. To test for nonresponse bias in this study, we compared the first-mailing responses with the second-mailing responses within each survey group. The comparisons within each group consisted of a series of Mann-Whitney U tests performed on the forty information items at an alpha level of 0.05. At the 0.05 level, we expected that approximately two of the forty tests ($40 \times 5\% = 2$) within each survey group would be significant solely as a result of chance. The test results showed that two of the tests within the 'larger bank' group and five of the tests within the 'smaller bank' group were significant at the 0.05 level. Although these results do not appear to be strong enough to establish the existence of a material nonresponse bias, the reader is nevertheless cautioned that the results and conclusion of the study are based on the responses received. Generalisations beyond the data actually gathered cannot be made with complete assurance.

Results

Mean responses for each of the forty questionnaire items were calculated and ranked for the larger bank group and the smaller bank group. The means and rankings summarise the degree of importance that the respondents within each survey group attribute to each questionnaire item. The higher the mean, of course, the higher the importance as perceived by the respondents. A standard devi-

¹¹Banks included in the 'larger bank' and 'smaller bank' groups were identified in the March 31, 1981 issue of *The American Banker*. The size rankings are based on deposits. We did not include Puerto Rican banks in the study because loan officers at these banks may have a different frame of reference from loan officers in the USA.

¹²The median amount of deposits as of December 31, 1980 for the banks included in the 'larger bank' group was approximately \$1.5 billion.

¹³The median amount of deposits as of December 31, 1980 for the banks included in the 'smaller bank' group was approximately \$125 million.

Table 1
Summary of Questionnaire Results^a

Items 1-25 are reported according to
conventional GAAP:

	Larger Bank Group			Smaller Bank Group			Mann-Whitney Results ^c
	Mean ^b	Ranking	Standard Deviation	Mean ^b	Ranking	Standard Deviation	
1. Sales revenue	3.604 (EI)	3	0.766	3.555 (EI)	4	0.660	NS
2. Cost of goods sold (FIFO pricing method)	3.541 (EI)	5	0.698	3.395 (VI)	6	0.727	NS
3. Depreciation expense (straight-line method)	3.478 (VI)	7	0.749	3.219 (VI)	13	0.904	S
4. Operating income or loss	3.757 (EI)	2	0.576	3.840 (EI)	2	0.411	NS
5. Extraordinary gains or losses (if any exist)	3.432 (VI)	9	0.805	3.193 (VI)	15	0.895	S
6. Net income	3.856 (EI)	1	0.378	3.857 (EI)	1	0.509	NS
*7. Earnings per share of common stock	1.351 (SI)	40	1.093	1.210 (SI)	40	1.024	NS
8. Inventory (FIFO pricing method)	3.396 (VI)	10	0.766	3.219 (VI)	13	0.772	NS
9. Total current assets	3.279 (VI)	16	0.926	3.445 (VI)	5	0.685	NS
10. Property, plant and equipment	3.279 (VI)	16	0.800	3.294 (VI)	10	0.774	NS
11. Total current liabilities	3.369 (VI)	12	0.894	3.580 (EI)	3	0.589	NS
*12. Deferred income taxes	2.820 (VI)	23	0.965	2.790 (VI)	21	0.872	NS
13. Dividends declared on common stock	2.856 (VI)	22	1.119	2.580 (VI)	25	1.211	NS
*14. Statement of changes in financial position	3.324 (VI)	14	0.965	3.177 (VI)	16	0.850	S
15. Summary of accounting methods in use when alternative methods exist	3.225 (VI)	18	0.941	2.983 (VI)	19	0.939	S
16. Nature of changes in accounting principles (e.g., a change from LIFO to FIFO)	3.550 (EI)	4	0.723	3.269 (VI)	12	0.778	S
*17. Revenue associated with each industry segment of a business that operates in more than one industry	2.982 (VI)	21	0.820	2.731 (VI)	23	0.778	S
*18. Operating income or loss associated with each industry segment of a business that operates in more than one industry	3.090 (VI)	20	0.869	2.849 (VI)	20	0.755	S
*19. Amount of depreciation expense (straight-line method) associated with each industry segment of a business that operates in more than one industry	2.441 (MI)	28	0.988	2.328 (MI)	28	0.949	NS
*20. Amount of capital expenditures associated with each industry segment of a business that operates in more than one industry	2.640 (VI)	25	0.980	2.605 (VI)	24	0.815	NS
21. Sales revenue earned during each of the four quarters of the most recent							

22. *Net income earned during each of the four quarters of the most recent fiscal year*

*23. Working capital provided by operations

*24. Cash provided by operations

*25. Capital leases reported by lessees as assets and liabilities in the balance sheet^a

2.604 (VI) 26 1.003 2.740 (VI) 22 NS
 3.189 (VI) 19 0.869 3.387 (VI) 8 NS
 3.460 (VI) 8 0.736 3.395 (VI) 6 NS

2.685 (VI) 24 1.128 2.252 (MI) 32 S

Items 26-30 represent *management's forecast* for the next fiscal year:

26. Forecasted sales revenue 15 0.908 3.101 (VI) 17 S
 27. Forecasted net income 10 0.887 3.294 (VI) 10 NS
 28. Amount of financing planned 6 0.785 3.378 (VI) 9 NS
 29. Planned advertising expenditures 39 1.019 1.866 (MI) 39 NS
 30. Planned capital expenditures 13 0.815 3.084 (VI) 18 S
 *31. Income from continuing operations 30 1.237 2.345 (MI) 27 NS

Items 31-35 are reported on a *constant dollar basis*:

*32. Cost of goods sold (FIFO pricing method) 32 1.190 2.235 (MI) 34 NS
 *33. Depreciation expense (straight-line method) 35 1.176 2.076 (MI) 37 NS
 *34. Inventory (FIFO pricing method) 31 1.161 2.261 (MI) 31 NS
 *35. Property, plant and equipment 34 1.092 2.277 (MI) 30 NS

Items 36-40 are reported on a *current cost basis*:

*36. Income from continuing operations 36 1.235 2.252 (MI) 32 NS
 *37. Cost of goods sold 38 1.187 2.177 (MI) 35 NS
 *38. Depreciation expense (straight-line method) 37 1.120 2.008 (MI) 38 NS
 *39. Inventory 33 1.164 2.311 (MI) 29 NS
 *40. Property, plant and equipment 29 1.130 2.160 (MI) 36 NS

^aInformation items marked by an asterisk (*) have been suggested in the literature as being inappropriate to require of smaller companies.

^bBased on the scale used in the questionnaire, verbal labels were assigned to the mean responses as follows:

Label	Range of Means
EI = Extremely Important	3.500-4.000
VI = Very Important	2.500-3.499
MI = Moderately Important	1.500-2.499
SI = Slightly Important	0.500-1.499
NI = Not Important	0.000-0.499

*NS—Not significant at $\alpha = 0.05$; S—Significant at $\alpha = 0.05$.

^aThe actual wording of the lease information (item 25) in the questionnaire was as follows: 'Based entirely on the usefulness of the information to you, how important is it for a lessee company to report capital leases as *assets and liabilities* in the balance sheet rather than exclusively in the *footnotes* to the financial statements?'

ation was also calculated for each information item. This statistic reveals the extent of agreement within each survey group concerning the importance of the information items. The larger the standard deviation for an information item, the less the respondents within each group tend to agree concerning the item's importance. The Mann-Whitney U test was used to provide a basis for comparison of larger bank versus smaller bank responses to each questionnaire item. Finally, in order to evaluate the degree of association between the responses of the two groups of bankers, the Kendall Rank Correlation Coefficient (τ) was computed for the ranked means of the responses. Table 1 presents a summary of the results of the analysis of the questionnaire responses.

The null hypothesis that the larger bank responses and smaller bank responses were drawn from the same population was tested using the Mann-Whitney U test for each of the forty questionnaire items. As shown in Table 1, only ten of the forty U tests were significant at the 0.05 level or less (two-tailed). Approximately two ($40 \times 5\% = 2$) of the tests would be expected to be significant by chance. The fact that thirty of the forty tests (75%) were *not* significant suggests that the two survey groups have substantially similar (although not identical) needs for the information items included in the questionnaire.

The finding that the needs of the two groups are similar was corroborated by the Kendall Rank Correlation Coefficient that was calculated for the ranked mean responses of the larger bank group and the smaller bank group. The Kendall's tau value was 0.78, significant at the 0.001 level. Because tau is essentially a measure of the amount of agreement between two sets of rankings (-1 would indicate perfect negative correlation and $+1$ would indicate perfect positive correlation), the high positive value of τ suggests that there is substantial agreement between the ordering of larger bank and smaller bank responses. Thus, the two groups generally tend to agree about the degree of importance of most questionnaire items.

As indicated earlier, twenty of the forty questionnaire items have been suggested in the literature as being inappropriate to require of smaller companies. These twenty items are indicated by an asterisk in Table 1. Only four of the ten items that yielded significant results on the Mann-Whitney U test are included among this group of twenty items. The four items are the statement of changes in financial position, revenue associated with each major industry segment, operating income or loss associated with each major industry segment, and capital leases reported as assets and liabilities (item numbers 14, 17, 18 and 25). Each of these four items was rated by both survey groups as very important with the exception of capital leases reported as assets and liabilities, which was rated

as only moderately important by the respondents in the smaller bank group.

The mean responses for the larger bank group range from 3.856 for net income to 1.351 for earnings per share of common stock. The respondents in this group rated six of the forty questionnaire items as extremely important, twenty-one as very important, twelve as moderately important, and one as slightly important. Except for earnings per share and depreciation expense associated with each major industry segment, the larger bank group assigned ratings of extremely important or very important to each of the twenty-five items that are reported according to conventional GAAP (see Table 1). Of the five items of forecasted information, the larger bank respondents rated as extremely important the amount of financing planned for the next fiscal year. In contrast, the amount of planned advertising expenditures for the next fiscal year was rated as only moderately important. The remaining three items in the forecast category were considered to be very important.

The larger bank respondents did not assign much importance to either the constant dollar or the current cost information items included in the questionnaire. Each of the ten items in these categories was rated as only moderately important. These relatively low ratings are interesting and somewhat surprising when one considers the theoretical arguments that favour these systems of accounting and the fact that these types of information had been made publicly available by at least 1,100 companies for the two years before the time that the respondents completed the questionnaire. The low ratings are consistent, however, with the findings reported in a study by Benston and Krasney of the demand for alternative accounting measurements by life insurance company investment officers.¹⁴ It should also be noted that the terms 'constant dollar accounting' and 'current cost accounting' were carefully defined and illustrated in the questionnaire in order to minimise the chances of confusion concerning these relatively new types of accounting information. The standard deviations associated with the constant dollar and current cost information are relatively high. This suggests that the larger bank respondents tend to disagree with one another concerning the importance of these types of information.

The mean responses of the smaller bank group range from 3.857 for net income to 1.210 for earnings per share of common stock. The smaller bank respondents rated four of the forty questionnaire items as extremely important, twenty-two as very important, thirteen as moderately important, and one as slightly important. Generally, the same observations that were made above for the larger

¹⁴See Benston and Krasney (1978).

bank group in regard to the various categories of information included in the questionnaire also pertain to the smaller bank respondents. A noteworthy exception, however, is capital leases reported as assets and liabilities which was regarded as very important by the larger bank group, but only as moderately important by the smaller bank group. The Mann-Whitney U test revealed a significant difference between the two survey groups concerning the importance of this item.

Generally, an inverse relationship exists within each respondent group between the means and standard deviations. In other words, the information items having the lowest means tend to have the highest standard deviations; similarly, the items having the highest means tend to have the lowest standard deviations. This finding suggests that the respondents within each group tend to agree concerning the importance of the highly rated items; they tend to disagree concerning the importance of the items rated relatively low.

Conclusion

The conclusion of the study is that the informational needs of bank loan officers do not differ substantially between large public companies and small private companies. This conclusion does not lend support to those who argue for two sets of GAAP. In order to argue persuasively in favour of two sets of GAAP from a user-oriented perspective, a person would need to demonstrate that user informational needs differ substantially depending on the size or ownership characteristics of a reporting company. The findings reported in this study suggest that the needs of loan officers who make lending decisions involving large public companies are actually similar to the needs of loan officers who make lending decisions involving small private companies.

The idea of creating two sets of GAAP is only one of the possibilities that has been considered for solving the problem of accounting standards overload. Two other possibilities are (1) to retain the status quo, and (2) to simplify GAAP for all business enterprises regardless of size or ownership characteristics.¹⁵ The results of this study may be construed as lending limited support to each of these possibilities.

The idea behind retaining the status quo is to maintain the existing system of GAAP but to adapt the system so as to provide reasonable relief for smaller companies. In this study, we found that the smaller bank group does not attribute as much importance to capitalised lease information as does the larger bank group. This finding lends support

to the argument that smaller companies should perhaps not be required to capitalise leases on their balance sheets, especially when one considers that this type of information is relatively costly to produce. Additional research would be needed, of course, before accounting policy changes are recommended in this area.

Perhaps GAAP should be simplified for all business enterprises regardless of size or ownership characteristics. In this study, we found that many of the information items were rated by both respondent groups as only moderately important or slightly important. Perhaps some or all of these items should not be required of any companies, especially in those cases where the information is relatively costly to produce. Once again, however, we believe that additional research would be needed before accounting policy changes are recommended.

Finally, it is extremely important that the findings and conclusion of this study be considered in light of the limitations associated with the research design and implementation. When interpreting this study, a reader should carefully consider that the results are based on perceptions, that the response rate was less than 100 percent, that bank loan officers were the only users of accounting information considered in the study, and that only one type of decision (i.e., a term loan decision) was studied. Although we do not believe that these limitations are overwhelming when viewed within the context of a single study, their existence accentuates the fact that the conclusion of the study must be considered tentative in nature. The fact that this study appears to be the first one that directly compares the informational needs of users of large company financial statements with the needs of users of small company financial statements further supports the tentative nature of the conclusion. We hope that additional studies in this area will be undertaken and reported and that these studies will contribute to an enhanced awareness of user informational needs.

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¹⁵American Institute of Certified Public Accountants (1981), p. 10.

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The 1952 Study, Accounting for Inflation. A Review Article

M. J. Mumford*

Introduction

The Association of Certified Accountants (ACA) has recently reprinted its study of replacement cost accounting, first published thirty years ago and a work of outstanding importance. The 1952 study *Accounting for Inflation* was written under the direction of a sub-committee of the Taxation and Research Committee of the Association of Certified and Corporate Accountants (ACCA). The group had power to co-opt members, and the work was shared amongst five Certified Accountants and four professional economists from the Economist Intelligence Unit, London. Thus the work represents a collaboration between accountants and economists of a kind that was even rarer at that time than it is today.

The text of the Study has been reprinted by the Association in its original form, even to the extent of leaving uncorrected some minor typographical errors.¹ Similarly, the empirical material on prices, capital stocks, taxation regulations, and the survey of practice in overseas countries remain as originally presented. The choice was between a completely new edition of the book, which would have destroyed the study as an historical document of great importance, or reprinting verbatim. This review article is designed to help to set the Study into context, and to comment with the advantage of thirty years' hindsight upon some of its features which appear to be dated. It is remarkable how little does need up-dating. To a considerable degree, publication of the Study with the imprint of 1983 would hardly diminish its relevance for British accounting. The original was well ahead of its time.

This article is divided into two parts. The first presents the background to the 1952 Study, in general terms and more specifically in respect of the accounting profession. The second part sets out

some origins of the ideas contained in the Study and appraises the arguments after the lapse of some thirty years.

Background to the 1952 Study

About the time of the publication of the study there were seven major professional bodies of accountants in Britain, with membership as shown in Table 1.

There was extensive debate over accounting disclosure, and more particularly over the treatment of inflation and rising asset prices, over the years 1948–1954, with strong disagreements within and between the several professional bodies. The ACCA 1952 Study was published in a climate of suspicion, even hostility from some accountants. Most of the professional bodies had published official Council views, and these ranged from strict adherence to historical costs (notably from the English Institute) through a more flexible and pragmatic view expressed by the Scottish Institute to full replacement cost systems advocated by the ACCA and independently by the Cost and Works Accountants (ICWA; now known as the Institute of Cost and Management Accountants, ICMA).

The most authoritative statements, however, were those of the English Institute, whose Council held resolutely to the view that profits should be calculated solely on the basis of the historical cost convention, with the effects of rising prices being recognised, if at all, by voluntary appropriations of profit to reserve.

It was not for another two decades that the English Institute was to express support for any departure from historical cost accounting, first supporting constant (or current) purchasing power adjustment by means of a retail price index, and later coming to favour the Current Cost Accounting alternative.² The influence of the ACCA 1952 Study survived the years, despite little impact in the

*I am grateful to the following for their help in preparing this paper: Dr. Bertram Nelson, Mr. Eric Hay Davison, and Mr. Robin Waldron; Mr. G. C. Hare and Mr. Jason Dalton; Professors Stephen Zeff and K. V. Peasnell; Val Goulding; and the University of Lancaster for financial support from its Research Grants Fund.

¹For example, on page 76, NOTE C, where k_t^1 appears instead of k_{at} , and page 57 where Sweeney appears as Sweeny.

²A comparison between the cycle of events in the inflation accounting debate between 1948 and 1954 and that between 1973 and 1978 is presented in Michael Mumford, 'The End of a Familiar Inflation Accounting Cycle', *Accounting and Business Research*, Spring 1979.

Table 1

Membership of the UK Professional Bodies in 1952

Institute of Chartered Accountants in England and Wales**	16,856
Society of Incorporated Accountants and Auditors**	9,518
Association of Certified and Corporate Accountants	8,314
Institute of Chartered Accountants of Scotland	5,349
Institute of Chartered Accountants in Ireland	860
Institute of Cost and Works Accountants	3,912
Institute of Municipal Treasurers and Accountants	2,619

**Merged in 1957

Source: A. A. Garrett, *History of the Society of Incorporated Accountants 1885-1957*, Oxford, Society of Incorporated Accountants (1961), p. 337

1950s. The arguments are clearly apparent in the later deliberations. To quote Mr. Jim Carty, a former Secretary of the Accounting Standards Committee:

Inflation accounting has been discussed for the past 30 years in the UK. In 1952 both the Association of Certified Accountants and Institute of Cost and Management Accountants produced major research studies which have been influential in the process leading to ED 18.³

Exposure Draft 18, which proposed a system of Current Cost Accounting similar to replacement cost accounting, was to be abandoned by the British profession the following summer, due to vigorous opposition from the rank and file members of the professional bodies involved, and in particular a resolution passed in June 1977 at an extraordinary meeting of the English Institute. The subsequent Exposure Draft 24 (published in April 1979) and then SSAP 16 (published in 1980) resemble the 1952 Study in many important respects.

Sources of ideas on inflation accounting in the 1940s

Gynther has put forward an explanation for the support given to the use of general price indices and of specific price indices in the process of adjusting historical cost accounts to reflect inflation:

Most accountants in public practice favour the use of one general index because many of their duties relate to the protection of the interests of shareholders. On the other hand, accountants in commerce and industry usually favour the use of specific indices. The author of this book has been affected by his environment (in industry)

and he is a firm supporter of the use of specific indices for the determination of profit, for balance-sheet valuations, and for day-by-day accounting and reporting purposes.⁴

There is of course another reason for accountants in public practice to prefer one general price index, namely their preference for a simple procedure, generally agreed throughout the profession, to deal with the controversial matter of inflation accounting. Their very proper concern for limiting subjectivity not only protects investors to some degree from improper manipulation of data by reporting management, it also lessens the exposure of professional firms to the risk of negligence claims. The important point here, however, is that accountants in commerce and industry usually favour the use of specific indices.

Not surprisingly, these accountants have their own form of bias in favour of protecting the interests of their corporations. Such a view would be consistent, for instance, with the work in America of Berle and Means.⁵ The ACA and the ICMA both concentrate, in terms of their membership, far more upon practice in commerce and industry than do the Institutes of Chartered Accountants. It is quite natural therefore that both should be more amenable to arguments for replacement cost accounting than the chartered accountants are.

Similarly, it is not surprising that the co-operation of the Association with the Economist Intelligence Unit should have succeeded, in the case of the 1952 Study, while the English Institute found little common ground in its collaboration with the National Institute of Economic and Social Research (NIESR). It was in 1945 that a joint exploratory committee was set up by the Institute

⁴R. S. Gynther, *Accounting for Price-Level Changes: Theory and Procedures*, Oxford, Pergamon, 1966, p. 45.

⁵A. A. Berle and G. C. Means, *The Modern Corporation and Private Property*, New York, Macmillan, 1933 and (2nd edition) 1966.

³Mr. Carty was writing in a personal capacity in *Accountant's Weekly*, 3.12.1976, p. 21.

with a view to a closer understanding between accountants and economists regarding the principles applied in their respective fields of work. The first task was agreed to be an examination of the major accounting concepts and of the more important terms commonly used by both accountants and economists.⁶

The membership was most distinguished, as was that of the Joint Advisory Sub-Committee which met together to discuss terms and concepts. The economists were J. R. Hicks, J. E. Meade, W. B. Reddaway, and Richard Stone. In 1951 the Report concluded that the principles involved in measuring the cost of fixed assets and inventory

rest on the conception of 'maintaining capital intact' and the effect thereof of the instability of money as a store of value, and it is on this fundamental matter that agreement has 'not been possible—not because of any lack of desire on either side to accommodate the view of the other, but because of differences in the objectives of the two groups.'⁷

Any other outcome would indeed have been extraordinary. On the one hand, the accountants on the Joint Advisory Sub-Committee were as well disposed towards replacement cost accounting as any group of chartered accountants was likely to be. They included Harry Norris and L. W. Robson who were both on record as favouring inflation accounting, and also F. S. Bray (later to become the Society's Stamp-Martin Professor, and already a leading replacement cost advocate). Of the remaining three, both P. M. Rees and B. Smallpeice were in industry. On the other hand, the economists were not accustomed to thinking in terms of the individual entity when talking of profits and losses; and the auditing background of the accountants tended to bias them towards a proprietary view of the firm, rather than an entity view which might have presented the possibility of a common meeting ground.

Common ground was successfully found in the case of the Association's 1952 study. The accountants and the economists were fully familiar with the needs of individual companies to preserve their operating capacity; and their shared set of interests and experiences must have helped greatly to produce an agreed system of current value accounting.

There already were, by 1952, several accountants and economists interested in trying to bridge the divide between the disciplines. Some economists,

like Kenneth Lacey, Leo T. Little and Peter Wiles, had a close working knowledge of accounting; and each wrote persuasively in favour of replacement costs.⁸ On the accounting side, H. Norris had published his book *Accounting Theory* in 1946 (Pitman) and was writing in *Economica* (1945) and *Accounting Research* (1949). E. Kenneth Wright was writing in *The Economist*, F. R. M. de Paula published *Developments in Accounting* with Pitman in 1948, F. S. Bray published *The Measurement of Profit* with Oxford University Press in 1949, and Dr. Leo Kennett frequently contributed to the Association's journal *The Accountant's Journal*; while *The Accountant* and *The Economist* contained argument after argument on the subject of inflation accounting over the years 1945–1952.

There were even inputs from the university sector, unusually for Britain in those days. A part-time Chair of Accounting had been set up at the University of Birmingham as long ago as 1902.⁹ But progress was slow.

At the end of World War II there was not one professor of accounting in the whole of England and Wales (part-time Chairs in Birmingham and London having lapsed). In the next eleven years there were three appointments to Chairs.¹⁰

These three Chairs were at Bristol, Birmingham and the LSE, with W. T. Baxter, appointed to the LSE in 1947, adding his voice to the clamour for inflation accounting.¹¹ (The Stamp-Martin Chair seems to have been overlooked in the list above; but this was not tenable within a university).

Despite the low priority accorded to accountancy in British universities in the 1940s, a certain amount of research was being undertaken. Probably the outstanding contributions were from Basil Yamey (an economist very interested in the early history of accounting) and Ronald Edwards (a Certified Accountant, later to take a Chair in Economics and to become Chairman first of the Electricity Council and then of the giant Beecham

⁸See for example, K. Lacey, 'Profit Measurement and the Trade Cycle', *Economic Journal*, 1947; and *Profit Measurement and Price Changes*, London, Pitman, 1952. Peter Wiles, 'Corporate Taxation based on Replacement Cost', *Accounting Research*, January 1951; and 'Agenda for the Age of Inflation', *The Economist*, August and September 1951. Leo T. Little, 'Replacement Costs: An Economist's Viewpoint', *Accounting Research*, November 1948; and 'Unsettled Territory', *Accounting Research* January 1952.

⁹See, 'The L.S.E., 1895–1945', *Economica*, February 1946, p. 24.

¹⁰R. H. Parker, 'British Men of Account', *Abacus*, June 1978, p. 62. There were part-time chairs in Scotland, however, including those at Edinburgh and Glasgow universities.

¹¹W. T. Baxter, *Accountants and the Inflation*, a paper presented to the Manchester Statistical Society, February 9, 1949; also in W. T. Baxter (ed.) *Studies in Accounting*, London, Sweet and Maxwell, 1950. He argues for current purchasing power adjustments, but, unusually, based upon start of year, rather than end of year, price index levels.

⁶Report of the Joint Exploratory Committee appointed by the Institute of Chartered Accountants in England and Wales and the NIESR, *Some Accounting Terms and Concepts*, Cambridge University Press, 1951, Foreword.

⁷*Loc. cit.*, pp. 31–2.

Group of companies). Edwards wrote some important material on the origins of cost accounting in *The Accountant* in 1937; and of greater significance in the present context was his series of essays in the same journal of 1938 under the title 'The Nature and Measurement of Income'. Unfortunately for the profession, his interests moved away from accounting towards industrial economics during the War.

Interest in inflation accounting was not restricted to Britain of course. The debate was international, and had proceeded for some decades before 1952. The Fourth International Congress of Accounting took place in London in 1933. It produced less of a dramatic confrontation than the 1929 Congress in New York, when British and German accountants had taken markedly different positions over inflation accounting (the British opposed, and the Germans in favour). American views tended to support the use of historical costs.

The Wall Street crash had taken place immediately after the 1929 International Congress. Accountants were thrown into turmoil along with the rest of the financial community. The most significant long-term effect in America was the setting up of the Securities and Exchange Commission (SEC), following the Securities Act of 1933 and the Securities Exchange Act of 1934. This formally conferred on a Federal agency the power to draw up authoritative statements on accounting principles.¹² The SEC was imbued with an almost missionary zeal in its campaign against asset revaluation, right from the outset. Neither the profession nor the academics could make headway against such a powerful opposition; but in all honesty, there seems to have been little wish to depart from historical cost accounting. Important statements by the American Institute of Accountants in 1938¹³ and by the American Accounting Association (AAA, the leading academic body) in 1940¹⁴ both set out an exposition of the main features of the historical cost system, and rationalised its practices. Individual critics wrote of the need to use current values, but the ground was barren and the climate bleak. H. Sweeney later wrote of the poor response which his 1936 book, *Stabilised Accounting*, received when it was first issued.¹⁵

¹²See S. A. Zeff, *Forging Accounting Principles in Five Countries: A History and An Analysis of Trends*, Champaign Ill., Stipes, 1971 for the history, particularly between pp. 119–167.

¹³T. Sanders, H. R. Hatfield and U. Moore, *A Statement of Accounting Principles*, American Institute of Accountants, 1938.

¹⁴W. A. Paton and A. C. Littleton, *An Introduction to Corporate Accounting Standards*, Urbana Ill., American Accounting Association, 1940.

¹⁵H. Sweeney, *Stabilised Accounting*, New York, Harper, 1936, reprinted by Holt, Rinehart and Winston, 1964 with a substantial introductory essay by Sweeney, explaining the origins and the effects of his 1936 publication.

The onset of war increased the pressure on accountants in America, albeit a little less dramatically than in Europe because preparations were less hasty. An increase in the general price level produced renewed interest in inflation accounting, with the AAA edging gradually closer to acceptance of general price level index adjustments, until Supplementary Statement No. 2 in 1951 at last recommended the practice.¹⁶ Empirical work on the effects of such index adjustments made an impact also. Ralph C. Jones published 'The Effect of Inflation on Capital and Profits: the Record of Nine Steel Companies' in the American Institute's professional journal, *Journal of Accountancy*, in January 1949; he was to carry out further research of this kind for the American Accounting Association later in the 1950s. Perry Mason, whose *Principles of Public-Utility Depreciation* had been published by the AAA in 1937, wrote an analysis of the general price index adjustment system in 1956, some seven years before the American Institute published its own study on the subject.¹⁷

Probably the most authoritative statement in favour of this form of inflation adjustment came from the Study Group on Business Income, set up by the American Institute with backing from the Rockefeller Foundation in 1947. Its report was published in 1952, after extensive discussions between accountants and economists; it recommended price level adjusted accounts, albeit with statements of dissent from eight of the forty-four signatories. George O. May took the leading part in the Study Group throughout, and (with O. Knauth) wrote the first draft of the report.

May was a figure of exceptional importance. Having joined Price Waterhouse in London in 1897, he went to New York in the same year, becoming a partner five years later. He was a chartered accountant as well as a certified public accountant; and from 1914 he was a partner in the UK practice as well as in the American firm. He thus contributed to the flow of communications across the Atlantic, as well as playing a leading part in the American profession. He was persuaded of the merits of index adjusted accounts before the Second World War; and some of his English colleagues came to the same view, notably W. E. Parker (later Sir Edmund Parker) who urged the English Institute to publish its own study on the subject, which appeared eventually in 1968. The movement of practitioners between Britain and America helped to keep inflation accounting a live

¹⁶American Accounting Association, Supplementary Statement No. 2, 'Price Level Changes and Financial Statements', *Accounting Review*, October 1951.

¹⁷Perry Mason, *Price-level Changes and Financial Statements*, AAA, 1956; Staff of the Accounting Research Division, AICPA, *Reporting the Financial Effects of Price Changes*, AICPA, 1963.

issue, and so did the visits of American academics like H. R. Hatfield, W. A. Paton, and in the 1950s, P. W. Bell. Some major American companies between 1946–48 sought to publish accounts incorporating current replacement costs, but the SEC put an end to this development by refusing to file the accounts, which had not been given 'clean' audit reports.¹⁸ Moreover, the American Institute remained firmly wedded to historical cost accounts, as reaffirmed in its Accounting Research Bulletin No. 33 in December 1947 and No. 43 in 1953. The English Institute was affirming the same belief when it issued, in its series of *Recommendations on Accounting Principles*, its Recommendation N XII in 1949, and Recommendation N XV in 1952.

If there was interest in America during the 1940s, it is no exaggeration to say that there was excitement in Britain. The hectic days of the war years led on to no less hectic days of discussion and debate once the war was over. For one thing, the generation of students who took up places in the universities in 1945 and 1946 included a large proportion of ex-servicemen, full of ideas and exuberance. Not readily over-awed by their professors, they made university life more challenging than it had been for many years. A number of them entered accountancy after graduating.

Then there were the 'refresher courses', provided for accountants returning from active service. F. R. M. de Paula had been involved in running courses for returning accountants in 1918, and in 1945 he proposed to the Council of the English Institute that there needed to be the same sort of thing. A book was prepared, running to 100 pages, and around 30 courses were run, lasting 4 or 5 days each, in various parts of the country. Attendances were high and enthusiastic. The effects were felt not only by the participants, but also by the tutors who were brought into the scheme, for many of whom this represented their first teaching engagement.

The English Institute had generally been seen by its membership up to this point as a remote body, restricted in its role to examining and to its disciplinary functions. The new burst of activity so raised morale that when shortage of money made it necessary for the Institute to ask for a voluntary increase of 100% in the membership subscription, some '80% of members responded to the appeal during the years 1946, 1947 and 1948'.¹⁹

Moreover, some of those members brought together by refresher courses continued to meet for years thereafter to discuss accounting ideas. Harry

Norris and Eric Hay Davison, together with Lord Latham (a certified accountant, and later President of the Association) formed a lunch club which continued to meet for many years. Similarly, a group of two dozen or so formed the '1949 Group' with regular evening meetings monthly. Its members were mainly from practising offices, and several became very senior members of the profession.²⁰ Inflation accounting was a subject of deep and continuing concern at these meetings.

It is not surprising that the same solutions to the problems of inflation accounting were 're-discovered' several times over. With practically no university tradition in accountancy to draw upon in Britain, the earlier work such as that of Paton, Hatfield, Eric Kohler and R. B. Kester was quite unknown to the majority of these practitioners. Moreover, the concepts themselves were not always well defined. There was confusion over the distinction between general and specific price index adjustments within these discussion groups, just as there was within the academic literature.²¹ There were arguments over the problems of measuring and defining physical capital, in the context of replacement cost income. There were arguments over the relevant indices that might be used as an alternative, as well as over the nature and construction of such indices.

Despite all the debate amongst the members of these various groups, the English Institute could not be persuaded to depart from historical cost. Recommendation N IX on depreciation and N X on the valuation of stock-in-trade were both published in 1945, and both indicated the use of historical costs (or, in the case of stocks, market value if lower). Recommendation N XII, 'Rising Price Levels in Relation to Accounts', was published in January 1949, and this directly addressed the problem of accounting under conditions of inflation. The Recommendation considered the various alternatives, and concluded that historical cost was basically adequate. If asset replacement was expected to be difficult for a company, its proper course of action would be to set aside part of the profits by way of a transfer to reserve. This was not to be regarded as part of the cost of doing business in past periods. Any scope for alternative interpretations of the newly passed Companies Acts (which defined 'Provisions' and 'Reserves') was to be limited.

¹⁸S. A. Zeff, 'Episodes in the progression of price-level accounting in the United States', *The Accountant's Magazine*, April 1964.

¹⁹H. G. Howitt, *The History of the Institute of Chartered Accountants*, op. cit., p. 107. The English Institute was unable to raise subscriptions without revising its Royal Charter, accomplished in December 1948.

²⁰Hugh Nicholson, Peter Morgan-Jones, James Mann and Godfrey Judd and W. W. Fea, for example; while Presidents of the Group included Guy Densem, E. Kenneth Wright and Douglas Morpeth.

²¹See S. A. Zeff, 'Replacement Cost—Member of the Family, Welcome Guest or Intruder?', *Accounting Review*, October 1962. The idea of separating operating profits from 'holding gains' (i.e. the rise in asset prices over time) was by no means new. It occurs in Paton (1918), Hatfield (1927) and Rufus C. Rorem (1929).

The Millard Tucker Committee on the taxation of trading profits was set up in June 1949, and the Royal Commission on the Taxation of Profits and Income began work in 1951. Evidence to both revealed deep disagreements amongst accountants. The Association was convinced that the problems of current value accounting could be overcome.²² The English Institute urged retention of historical costs. But certain prominent chartered accountants, such as F. R. M. de Paula, were calling for replacement costs to be used for taxation even though they advocated historical costs for income reporting.²³ Moreover the 1949 Group made its own submission to the Royal Commission in favour of current value accounting, stating that the views expressed by the English Institute did not represent the views of a substantial part of its membership. Faced with such contradictory views, both the Millard Tucker Report and the Reports of the Royal Commission rejected proposals for any change from the existing use of historical costs. *The Economist* was caustic in its editorial comment in August and September 1951, while many businessmen were bitterly disappointed that no progress had been made in one of the few areas in which they believed they had the support and understanding of the Labour government.²⁴ The disagreements also threatened disharmony at the International Congress on Accounting taking place in London in 1952, sponsored jointly by the seven British professional bodies.

It is against this background, then, that the Association's 1952 Study can best be understood.

The Study had its origins in a series of discussions between the Association's Technical Research Committee (as it was then known) and Professor Donald Cousins, newly appointed to the Chair of Accounting at Birmingham University. It was agreed in 1948 that the subject of replacement costs in an inflationary economy and the 'provision of depreciation allowances' would be worth investigating, including comparison with practice in other countries.²⁵ In 1949, after further clarification of the terms of reference of such an investigation, the Committee also set up its own Ad Hoc Research Committee on 'Inflation and Replacement Costs' to compile a research pro-

gramme with broader terms of reference, including a study of the taxation aspects. It was agreed to carry out a joint research enquiry with Birmingham University on 'Capitalisation of Business and Replacement of Industrial Assets', to prepare a questionnaire to be sent to members of the Association, and to engage a researcher jointly with Birmingham even though the Association had been warned by the university 'that the value of such research work will not be wholly practical'.

The Council of the Association rejected the joint Birmingham research proposal at its meeting on 14 June 1949. The Technical Research Committee itself was reconstituted; but its Ad Hoc subcommittee survived, with Nicholas Stacey as its secretary until he left the Association in 1951. It prepared first the Association's submission to the Millard Tucker Committee and then its plans for a treatise on inflation accounting. Members included L. J. Davey (Chairman), and Leo Kennett, the latter being responsible for preparing notes on 'the theoretical implications of economic income.' Early in 1950 the Economist Intelligence Unit was invited to propose a scheme of research, which was adopted and which later formed the basis of the Study. A Consultative Panel was to oversee the project; it consisted of W. E. Stepto, Lord Latham and B. E. S. Rodgers, with Geoffrey Browne and Kenneth Wilson (evidently authors of the draft scheme) from the Unit. A budget of £1,300 was proposed, and 2,000 copies of the resulting study were to be printed. This was accepted by Council on 14 November 1950. (The Unit was also asked to help provide evidence for submission to the Royal Commission on Taxation, which led to publication of the Economist Fixed Asset Replacement Cost Index from 1951.) A completed draft of the study was considered by the Consultative Panel in November 1951, and several amendments were suggested, but not adopted in view of a perceived need to publish urgently.²⁶

The book appeared in August 1952, showing membership of the joint working party as L. J. Davey, A. C. S. Meynell, Lord Latham, B. E. S. Rodgers and W. E. Stepto for the Association, and G. S. Browne, J. Campbell, W. G. Mills and K. J. Wilson for the Unit.

An Appraisal of the Association's 1952 Study

Considering that the 1952 Study was prepared by a committee, it is a remarkably clear exposition. It has been argued that the debate on inflation accounting between 1945 and 1950 had been lively but sometimes confused. The new Study was nevertheless to find a working formula which could unite accountants with business economists in a

²²Association of Certified and Corporate Accountants, *Memorandum submitted to the Royal Commission*, reprinted in *Accountants' Journal*, July 1951.

²³F.R.M. de Paula in a speech at Brighton, reported in *The Accountant*, 5 June 1948.

²⁴See for example, Harry Norris, 'After the Tucker Report', *The Banker*, May 1951.

²⁵Secretary to the Committee was J. C. Latham, and Assistant Secretary was N. A. H. Stacey, himself to become the author of an interesting study of the accounting profession, *English Accountancy: a Study in Social and Economic History, 1800-1954*, Gee and Co. (1954).

²⁶At several points the Minutes of the Committee and of the Council refer to the desirability of publishing before other bodies did so. Presumably the work of the ICWA was in mind.

way the 1945–51 initiative of the English Institute and the National Institute of Economic and Social Research had apparently been unable to conceive as possible.

Yet the Study began without great expectations. As the Preface states:

The writing of this work was originally conceived as a pure piece of research. It was not intended that it should directly result in a fully-worked-out solution to all the problems involved. It would indeed be presumptuous to expect this of a single piece of research . . . The reader is asked to bear with the authors in their task of sifting fact and theory in the borderland between economic theory and accounting practice.²⁷

It is significant that reference is made to 'economic theory and accounting practice'. The idea of a separate body of 'accounting theory' was not familiar to Britain in the 1940s, and accounting was still thought of as a branch (and not a very important branch) of economics. This helps to explain the poor progress of academic accounting, as an offshoot of economics departments, and involved primarily in service teaching. Insofar as there were any theoretical underpinnings, so went current conventional thought, these were drawn from economics in England, and to some extent the law in Scotland. Accounting measures of income tended to be judged according to their proximity to economic concepts, particularly the concepts of personal income still being refined by Hicks and Kaldor.²⁸

The basic argument in the Study was that the cost of using fixed assets and inventories should be measured in terms of current replacement costs, as opposed to historical costs. The argument proceeded along two different, but related, lines. The first showed how the use of historical costs while measuring income was appropriate to maintaining original money capital invested in the firm, but not to maintaining real physical capital in periods of rising prices. The Study argued that capital maintenance should be defined in terms of production capacity. The second line of argument, which has sometimes been considered as logically separable from the first, seeks to measure current activities more meaningfully than is performed by the conventional system. This requires a separation between 'operating gains' and 'holding gains' (to use

the later terminology of Edwards and Bell).²⁹ In the analysis of the 1952 Study this also involved removing from reported income the effects of increases in the prices of assets held, whilst charging income with current costs when these assets were consumed by use or resale.

The style of the Study is careful and moderate. It may be a valid criticism that the linkage is not well drawn between the problems alleged to beset business enterprises during the years of inflation, and the adoption of the proposed system of inflation accounting. What difference would it actually make, if it were put into practice? The authors do not state explicitly that resources will be better allocated, dividends reduced where they would otherwise be payable out of real capital, and taxation lightened upon capital intensive firms. But the implications are clear enough. Reform of the accounting system may not be a *sufficient* condition for curing evils, but in general it is regarded to be necessary. The capital stock of British industry had fallen in real terms between 1939 and 1950. The flow of dividends and tax payments exceeded the level of income needed to maintain physical capacity, let alone allowing for any capital formation. Measures of the return on capital employed, rates of profit on sales, stock market prices and ratios, all these were being based upon misleading figures.

There had been earlier books on replacement cost accounting, in English as well as in German and Dutch. A recent study by Whittington reviews this literature. The 1952 Study is unusual for its use of empirical evidence. First it is demonstrated that price fluctuations are not some sudden recent aberration in the economy, but have been the general experience certainly since 1790. Then evidence is presented for the statement that British business had not been maintaining its productive capacity intact between 1938–1950, in contrast to the picture presented by accounts. The Study suggests cautiously that various sources of evidence 'seem to suggest that depreciation provisions in 1950 were approximately 50% deficient of the value required when these provisions are recalculated on the basis of current replacement costs.' This estimate was happily substantiated by an almost identical figure published by the Federation of British Industries just as the 1952 Study was going to press.³⁰

Further demonstration of the case is based upon evidence published by other writers, and by a

²⁷Association of Certified and Corporate Accountants, *Accounting for Inflation*, (hereafter, the 'Study'), London, Gee and Co, 1952, p. 7–8.

²⁸The Hicksian concept of personal income was set out in J. R. Hicks, *Value and Capital*, Oxford, OUP, 1936; and despite the explicit warnings of Hicks, it has been taken as the basis for quite inappropriate definitions of business income ever since.

²⁹E. O. Edwards and P. W. Bell, *The Theory and Measurement of Business Income*, Berkeley, University of California Press, 1961. These authors do not remove holding gains from reported income, although they do distinguish them from operating gains. Only operating gains can be distributed if production capacity is to be maintained (except where technical change etc. lowers the cost of maintaining effective capacity).

³⁰Study, *op. cit.*, pp. 29–30 and fn. p. 30.

survey of the actual figures for thirty public companies:

In order to ascertain the quantitative effect of the problem, and in the absence of any adequate overall figures, an analysis was made by the authors of the actual experience, in so far as this is reflected in company accounts, of a small but carefully balanced sample of companies. This sample covers thirty public companies, representing a broad and representative cross-section of industry, varying in size from the very small to the very large.³¹

The analysis of the figures shows that dividends had increased very little between 1945 and 1950, and were actually lower than in 1938. This presented problems in raising additional equity finance for investment. Figures set out in the Study, and corroborated by the British Bankers Association, show how the shortage of equity finance had been made good by short-term sources from the banks and suppliers. In this part of the Study, as elsewhere, the traditions of economics and accountancy blend well to produce valuable statistical material both at the level of the firm and at national level.

The blend continues in the theoretical work, also, which draws widely upon the literature in Britain and elsewhere.

The proposed system of accounting is based upon existing practice in some important respects. In particular, the realisation convention is firmly embedded. While Hicks may well have proposed some useful ideas for considering personal income based upon subjective expectations, accounting had always tended to reject such an approach in favour of *ex post* analysis of events, verified by reference to external evidence, and preferably supported by some signs of physical action or tangible assets. The realisation convention required that no profits were to be taken into income until the time that a sale took place to an external party. This was viewed as the most important event in the cycle of business activities, and the whole profit on a transaction was deemed to arise at the instant of sale. In practice, the rule for recognition of income was somewhat rough and ready. At the date of the Study, it was not widely acknowledged just how vague were the basic principles of the convention, criticised so strongly by Sprouse and Moonitz in 1962.³² The idea that income was earned bit by bit, by the various activities of the firm (including speculative market transactions as well as manu-

facturing, transportation, packaging and so on) was no doubt recognised as a feature of business life, but to separate all these effects in regular income reports (say, by using the net realisable values of assets) was not regarded as practical.³³

Although the balance sheet is to be valued at current cost, for income statement purposes the realisation principle is adopted intact in the 1952 Study. The basic objective is to secure the matching of costs against revenue, as set out in the conventional guides of Sanders, Hatfield and Moore and of Paton and Littleton,³⁴ but using in place of historical costs the more relevant current replacement costs. If there was any confusion in the general inflation accounting debate over the distinctions between specific and general price indices, or between current and anticipated future price levels, there is none in the Study. After a review of 'The Orthodox View' of accounting income in Chapter III, there follows a very clear discussion of the ideas of current value accounting, making these very distinctions.

The discussion of replacement cost theory, contained in Chapter IV 'The Replacement Cost Approach and Fixed Assets', is of great interest still today. In a brief eight pages, there are many penetrating insights which bring together the views of the day, and place them in relation to one another. However there are some points which, with the advantage of hindsight, might have been more clearly expressed. One major difficulty arises over monetary assets. It is one of the objections expressed in the Study to the 'purchasing power approach' (or general price level adjustment, or current purchasing power approach as it has been variously named since 1952) that 'it purposely attempts to exclude the monetary factor' (p. 58). The meaning of this statement is not perhaps immediately obvious. After all, the 'purchasing power approach' includes monetary items, and indeed requires a statement of gains and losses arising out of the conversion of past sums of currency into the equivalent amounts of purchasing power at the one date selected.

But it is clear that, in the context of a replacement cost approach which proceeds by revaluing individual assets in the closing balance sheet, monetary assets may well appear to require no re-statement, which will ease the need for capital maintenance. If a doubling of fixed asset prices means a restating of all the assets on the balance sheet, and corresponding increases in the depreciation charge, then the substitution of money assets for some of those fixed (non-monetary) assets in

³¹Study, *op. cit.*, p. 32. It has proved impossible to trace the background papers to the Study or to identify this sample of companies.

³²R. Sprouse and M. Moonitz, 'A Tentative Set of Broad Accounting Principles for Business Enterprises', *Accounting Research Study No. 3*, New York, AICPA, 1962.

³³There had been suggestions in the literature for using current selling prices in accounts, for example by K. MacNeal, *Truth in Accounting*, Philadelphia, University of Pennsylvania Press, 1939.

³⁴See references 16 and 17.

the same balance sheet would, it is implied, mean less of a write-up, and less upward revision of the depreciation charge. This is the view of the Sandilands Report, which denied stoutly that monetary capital needs maintenance out of current earnings.³⁵

This view that monetary assets do not require any capital maintenance charge out of current income arises naturally enough out of a technique that concentrates upon the closing balance sheet. It seems to have been advocates of the use of index adjustments applied to the *opening* balance sheet who first argued for the maintenance of monetary assets. It is, for example, quite natural for Hendriksen to appreciate the problem, since his 1961 study of two public utility firms proceeds by using indices.³⁶ But it was quite another matter when Gynther advocated such a provision in his 1966 book since he was a 'specific asset' man.³⁷ The matter has been debated fiercely in Britain following the publication of the Sandilands Report, and now the MWCA has apparently won general acceptance.

Another view which was uncommon in 1952, but has since been strongly advanced, is that general and specific price adjustments may both be combined in the same financial statements. Both Stamp and Baxter have proposed this in Britain,³⁸ but the 1952 study gives the idea short shrift (p. 59).

The income model that is set out in the Study shows skill and care in its construction. The significance of *ex ante* and *ex post* estimates of asset volumes and prices is well appreciated, and the system purposely takes one period at a time, rather than seeking retrospective adjustments for all previous periods once a change in expectations takes place. The distinction between foreseeable wear and tear and obsolescence is well drawn, both in Chapter V and in the mathematical Notes at the end of that Chapter. The method is open to criticism, much more familiar today, that volumes of partly used fixed assets are not amenable to estimation, and that depreciation charges allocated between periods of time are essentially arbitrary.

The 1952 Study discusses at length one issue that has given great difficulty in the literature since that date. The question of 'backlog' depreciation has been a contentious issue for some years; it is unfortunate that the Study is not entirely clear on this matter, since it might have avoided thirty years of misconception.

The issue concerns the need for retrospective adjustment when prices rise and assets are written off over more than one period. Under a replacement cost system, the total charges for depreciation are based upon the write-off in each period, valued at the replacement cost in the relevant year. The question that then arises, of course, is whether or not there is a need for previous years' depreciation charges to be brought up to date, that is, to reflect the increases in replacement price which have occurred since depreciation was charged in earlier years. If the arrears are charged against income, this implies extra supplementary charges in later years in respect of earlier years' asset usage. But this way the complete replacement cost of the asset will have been charged against revenue by the time the replacement date arrives. The alternative approach appears, at first sight, to make the aggregate charge for depreciation over the asset's life dependent both upon the depreciation pattern and the pattern of price rises over that life.

The Study states that the system which charges backlog is strictly correct. The paragraph is important.

It is somewhat doubtful whether this second variant [that is, charging backlog against income] would, in fact, meet with wide support. It is as well to realise, however, that this particular variant is the true approach and is implicit in the proper application of Pigou's theory. Mere calculation of depreciation provision by reference to current replacement costs of fixed assets would be inadequate to provide sufficient cover for the total cost of maintaining physical assets intact if replacement had been previously delayed due to the fact that the machines were still in use or for some other reason. If the replacement fund has been held in the form of cash or other floating assets, the value of which has not appreciated to the same extent as the costs involved in replacement of the fixed assets for which this counterpart fund is intended, then a deficiency automatically exists. It is worth noting, however, that to the extent that funds so held have appreciated, the act of charging as current depreciation the inadequacy in the nominal value of accumulated past depreciation will result eventually in the accumulation of a replacement fund *larger* than is necessary.³⁹

³⁵The Report of the Committee on Inflation Accounting (the 'Sandilands Report'), 'Inflation Accounting', London, HMSO, Cmnd 6225, 1975.

³⁶E. S. Hendriksen, *Price-Level Adjustments of Financial Statements—An Evaluation and Case Study of Two Public Utility Firms*, Pullman, Washington, State University Press, 1961.

³⁷See footnote 5. For authoritative criticism of ED 18 for neglecting monetary items see Edward Stamp, 'ED 18 and Current Cost Accounting: A Review Article', *Accounting and Business Research*, Spring 1977.

³⁸E. Stamp, 'Income and Value Determination and Changing Price-Levels: an Essay Towards a Theory', *The Accountant's Magazine*, June 1971; and W. T. Baxter, *Accounting Values and Inflation*, London, McGraw Hill, 1975. Note however, that Baxter's system only maintains general purchasing power, while Stamp maintains value to the business.

³⁹Study, *op. cit.*, p. 54, emphasis in the original. Comment in parentheses added.

The third sentence contains the mischievous proviso 'if replacement has been previously delayed due to the fact that the machines were still in use or for some other reason'. Logically, this is wrong. The cost of using an asset is reasonably based, as one of the alternative choices, upon its replacement cost at the time it is used. If it is not replaced at that time, this cost figure is likely to alter, so that delaying replacement in a time of inflation will mean a higher replacement cost. Whether it is reasonable to charge against revenue the cost at the time the asset is used, or the higher cost when it is replaced is one argument, and an important one. Maintenance of physical operating capacity, as required in the 1952 Study, implies the latter even though this figure may well not be predictable at the time that the relevant income statements are drawn up. Presumably delaying replacement is beneficial to the firm: 'buying services in bulk' (as Peasnell has put it) saves costs. But the allocation problem that results can only be solved by arbitrary means. The extra element of replacement cost might be argued to relate to different time periods, or even allocated as an administrative or financing cost, perhaps, rather than an operating cost. But to deny its existence as a cost chargeable against income is bizarre.

The line of reasoning adduced in the 1952 Study appears to have originated with a 1948 article by David Solomons in the Association's *Accountants' Journal*.⁴⁰ It has been accepted by Baxter in 1975, and is embodied in the treatment of backlog depreciation required by the Accounting Standards Committee in Exposure Drafts 18 and 24 on 'Current Cost Accounting' and in SSAP 16 itself. The argument seeks to associate the cost of using a particular asset with the change in values of quite separate and distinct assets ('secondary assets' as they have been named) whose acquisition is regarded as an integral part of the use of the 'primary' asset.

The cause of the confusion is the use of the term 'the replacement fund'. The primary asset helps to produce revenue, part of which is regarded as recovery of the cost of the asset, while part pays for other inputs and, one hopes, leaves a profit. The question is to determine how large this profit element is. Whether the revenues are invested in one form of asset or another is immaterial. No particular assets can be identified, normally, as financed from any one source or another; but apart from this, there is no reason to make such a spurious linkage. The cost of using assets should be charged, under a physical capital maintenance system, at their own current cost, not at some figure depending upon changes in the value of

other assets. Granted, it makes a difference to the size of a firm's profits whether cash is turned into trading stock, or indeed put into a deposit account rather than held as cash. But these decisions are subsequent and separate. The Study makes the point that charging replacement cost plus backlog on the primary asset and the full replacement cost of secondary assets against income results in an aggregate charge higher than just the replacement cost of the primary asset. And well it should do if the aggregate physical operating capacity has risen and more assets are being used to produce an increasing revenue. The ultimate test under a physical capital maintenance model is whether an asset is capable of being replaced at the end of its life out of revenue, with charges just sufficient to allow this, neither too great nor too small. But by the same token, an increase in the volume of assets represents capital formation and, if this is out of revenue, it is re-investment of retained profit even if this should be only temporary. It may be difficult—or even impossible—to estimate the volume of physical assets. But this is a problem inherent in using this concept of capital.

Turning to another matter of controversy, the Study treats 'holding gains' (again using the term of Edwards and Bell) not as income but as a transfer to reserve: 'This part of profit ought not to be treated as an operating income but should more properly be treated as a capital gain' (p. 61). This assertion is justified in very curious terms: 'This is a statement of a position at an empirical level. It stands or falls at that level. It does not necessarily need substantiating by testing its conceptual validity at a theoretical level' (p. 61). As argued above, in the context of backlog depreciation, the test of success or failure may be determined ultimately at an empirical level: the question is whether the volume of physical assets (however this may be defined) rises or falls. But there is also a conceptual argument that needs to be established, quite distinct from the question of choosing a set of value judgements to justify one income measurement system rather than another.

The Study in many respects displays a political awareness and a sense of practicality that is commendable. The whole book only occupies 100 pages, plus another 50 for the survey of foreign countries. 'To make the work exhaustive would have required considerable elaboration; in any case, the work was already beginning to get too long for its present purpose' (p. 7). At the beginning of the Study, says the Preface, 'the authors originally set out without any preconceived notion as to the viewpoint that they would ultimately take' (p. 7). This may be taken at face value, even if there is reason to expect a group of business accountants and economists to have a bias towards an entity view, involving the maintenance of the productive capacity of the enterprise which pays

⁴⁰D. Solomons, 'Income—True and False', *Accountants' Journal*, October 1948. This is cited in the 1952 Study.

the salaries of their own colleagues and managerial peers.

At the end of the day, the Study is indeed a complete, workable blueprint with few gaps. It works from a book-keeping standpoint as well as from the standpoint of economic theory. The problems, especially those of technical change, are unavoidable in any system although they may appear more heavily disguised in some alternatives. The Study anticipates the range of likely objections which will be raised against its adoption.

For example, Chapter VI sets out a convenient and practical formula for adjusting inventory to current replacement costs—very similar to the system recommended in the Sandilands Report and incorporated in the subsequent Exposure Drafts and Current Cost Standard (SSAP16) by the British profession.

Perhaps the problems of auditing the new system were not fully recognised in the Study. However, this probably made little difference to its acceptance by the profession—or, rather its lack of recognition. The truth of the matter was that the Study had practically no effect because the adoption of inflation accounting was at heart a matter of political power rather than persuasion in the inflation debate of the 1950s. Having persuaded the Millard Tucker Committee of the impracticality of current value accounting, the International Congress went off without any major row. Members of the Institute complained, but did not take any drastic action. Parliament was convinced the matter was too complicated and technical for any intervention. Granted, a nasty row blew up in 1954,⁴¹ but the stock market was picking up again, and the rate of inflation beginning to die down. Sure enough, the whole debate died away for the next fourteen years or so.

What of the Association's Study? It remains a theoretical study of the first importance. In 1952 it was in many respects original and very well documented. The evidence was superbly marshalled, and the concluding part of the Study represents a high level of scholarship. The Appendix consists of a review of inflation accounting in Germany (mainly the history of 1922–3, from the work of Henry Sweeney); Belgium, France, Italy, Sweden and Denmark, mainly after 1945; and short reviews of the United States of America and Canada.⁴² This survey is of considerable interest, and the material is not easily accessible elsewhere for the period. Likewise, the Bibliography covers many of the most important sources available at

the time, and demonstrates the thoroughness which underlies the research.

In assessing such a piece of work, it is usual to review the other written work of the era. There were earlier books on replacement cost accounting, notably Sweeney's 1936 book, based largely on his studies of continental European experience before 1925. Few books specifically on the subject were available at the time in English. The papers submitted to the Study group on Business Income in America cover many of the same topics, but without supporting evidence of the same order. The ICWA showed how the records could be kept in their 1952 Study, but the arguments are by no means so explicit or well established.

As for subsequent writers, the Study was evidently of some value to Edwards and Bell in their famous 1961 book.⁴³

Gynther's 1966 book, which is well referenced to the literature, includes in its bibliography the Study as one of only 13 references dating back as far as 1952 out of 86 citations. Few of the later books make reference to the Study, however. The deductive analyses of Ladd and of Pattillo can have had little need to do so; they each put forward different arguments for wanting to use replacement cost information.⁴⁴ Ladd was concerned with making the large modern corporation accountable to the public for the exercise of its power over resources, in a society in which ownership was divorced from control. Pattillo sought to integrate accounting into a social concept of 'fairness to all parties'—a form of social contract. He advocated the use of replacement costs both to provide information on the value of resources controlled and also to aid comparisons between companies.⁴⁵

Similarly, the studies by Bedford and by Revsine are basically deductive; neither relies upon extensive links with the literature.⁴⁶ It is a little more surprising to find no reference to the Study in Hendriksen's *Accounting Theory*, particularly in view of the historical context which is traced by the author in his initial chapters.⁴⁷

One study which presents some analysis similar to the Association's 1952 Study is the work published in 1958 in Australia by Mathews and

⁴³According to the Preface, Bell spent 1956–57 in London engaged in research, and the Study appears in the bibliography, and (more significantly) in footnotes to pages 24 and 119.

⁴⁴Dwight R. Ladd, *Contemporary Corporate Accounting and the Public*, Homewood Ill., Irwin 1963.

⁴⁵James W. Pattillo, *The Foundations of Financial Accounting*, Louisiana State University Press 1965.

⁴⁶Norton M. Bedford, *Income Determination Theory: An Accounting Framework*, Reading Mass., Addison Wesley, 1966; Lawrence Revsine, *Replacement Cost Accounting*, Englewood Cliffs N. J., Prentice Hall, 1973.

⁴⁷Eldon S. Hendriksen, *Accounting Theory*, Homewood Ill., Irwin 1965.

⁴¹The Association, the Scottish Institute and the ICWA all published statements in favour of the use of current costs. The English Institute announced in January 1954 that no common ground could be found.

⁴²The absence of the Netherlands is curious and very unfortunate.

Grant.⁴⁸ This also presents evidence on the economic effects of using historical cost accounts during a period of inflation (although the period covered is 1945/46 to 1951/52, rather than 1939 to 1950). There are interesting links between theory and practical application. The most significant distinction between the 1958 and the 1952 studies is that Mathews and Grant advocate adjusting historical cost profits to reflect the current cost of depreciation and stocks consumed (rather like the CCA depreciation and cost of sales adjustments), rather than fully restated replacement cost income statements and balance sheets.

It is only to be expected, however, that the Association's Study will be known best in Britain. It has already been commented that it has been used heavily in the later professional pronouncements on inflation accounting, even if it is difficult to trace the origins of the ideas in such professional statements because of the lack of any bibliography or even an index in many of them. The 1952 Study stands out in the British accounting literature as an exceptionally well-written and

well-referenced work, even if it lacks an index itself.

As for the basic thesis, that current replacement costs should be used in place of historical costs, the state of knowledge has changed somewhat since 1952. It is now much more generally realised and accepted that, to quote the final paragraph of the Study:

Unless realism is injected into accounts such that current income is computed to eliminate what are properly capital elements, and such that remaining asset values are made to reflect current valuation, the assistance accounting can give to directors in providing a proper analysis of the real state of the business is artificially restricted. Accounts can cease to be a servant and can become a master.⁴⁹

The final sentence may be rather cryptic; but the message of the paragraph is clear enough. The survival of business firms requires replacement cost data as being more relevant than historical cost data. Unless accounts incorporate these, they are for many purposes of limited value. The same plaintive cry echoes in the ears of accountants to this day.

⁴⁸Russell Mathews and John McB. Grant, *Inflation and Company Finance*, Sydney, The Law Book Co. of Australia, 1958. I am grateful to Professor R. H. Parker for pointing out that Mathews was the supervisor of the thesis on which R. S. Gynther's 1966 book was based.

⁴⁹Study, *op. cit.*, p. 97.

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The Ledger of Cristianus Lomellinus and Dominicus De Garibaldo, Stewards of the City of Genoa (1340-41)

The Usefulness of a Measure of Wealth

Management's Preferences for FASB Statement No. 52:

Predictive Ability Results

Alternative Hypotheses Concerning Depreciation of Buildings

Some Problems with Replacement Cost Asset Measurement

for External Accounting Reports with Imperfect Markets

Duration and Fisher's Rate of Return Over Cost

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Split-Plot Repeated Measures Designs in Internal Control Judgement Research: A Note

Freddie Choo

In recent years, full and fractional factorial experimental designs have proven to be very valuable and popular research tools in internal control judgement research. Yet, apparently little attention has been given to the very useful special class of factorial designs called split-plot repeated measures designs.

Researchers in auditors' behaviour in internal control evaluations are often interested in conducting research that involves many *factors*, each with many *levels*. These factors are often the internal control questionnaires used by the auditors in making preliminary evaluation of their clients' systems of internal controls. The answers to these questions, either 'yes' or 'no', constitute the levels of the factors. In a factorial design with, say, six factors, each having two levels, there are altogether 64 ($2 \times 2 \times 2 \times 2 \times 2 \times 2$) factor combinations. Therefore, the minimum number of auditors (subjects) required is 64. However, it is desirable in factorial experiments to have more than one observation in each cell. If there is only one auditor in each cell, it is not possible to compute a *within-cell* estimate of experimental error. Therefore, in order to compute a within-cell sum of squares, a minimum number of 128 (64×2) auditors is required. Yet a sample of this size is often difficult to achieve in auditing research. Considerations such as time or cost often preclude the use of such a large sample of subjects and under these conditions several factorial design alternatives are available to the researchers. For example, Joyce¹ and Ashton² used a fractional factorial design to reduce the number of subjects. However another alternative, a split-plot repeated measures design, which receives little attention, is also particularly useful. This design permits the experimenter, by careful planning, to carry out

multi-factor experiments with a minimum number of subjects.

The following illustrates how a split-plot repeated measures design can be used in one particular internal control judgement research. Suppose we are interested in the auditors' preliminary evaluation of internal control of an account receivable subsystem based on a given set of internal control questions. In addition, suppose we observed that, in practice, auditors are constantly harassed by time budget pressure in formulating their preliminary internal control judgements (see e.g., Choo and Eggleton)³, and we are interested in testing the effects of high versus low time pressure constraints on these internal control evaluations. Let the time pressure be the non-repeated factor and be designated as high and low pressure conditions respectively. We then extract, say, five relatively important internal control questions concerning the account receivable subsystem from a longer list of internal control questions commonly used in practice. Let each of the five questions be the repeated factors and be designated as factors A, B, C, D, E with each factor having two levels—a "yes" and "no" response. Altogether 32 different sets of responses (2^5) can be generated and each of these is then represented as a hypothetical case which would have arisen from the preliminary review of the strength of internal control of the account receivable subsystem. More detailed discussions on the construction of these cases can be found in either Joyce or Ashton. Assuming our subjects consist of only 30 auditors representing two random samples of 15 auditors each, the two samples of auditors are then randomly assigned to the two levels of time pressure conditions and make judgements under all levels of A, B, C, D, and E factor combinations. A split-plot ANOVA of their judgements can then be obtained by running the data through a suitable computer statistical

¹Joyce, E. J., 'Expert Judgment in Audit Program Planning,' *Studies on Human Information Processing in Accounting* (1976), Supplement to the *Journal of Accounting Research* (14, 1976), pp 29-60.

²Ashton, R. H., 'An Experimental Study of Internal Control Judgments,' *Journal of Accounting Research* (Spring 1974), pp 143-157.

³Choo, F. and I. R. C. Eggleton, 'The Effect of Time Pressure on Auditors' Internal Control Judgements,' unpublished manuscript presented at the American Accounting Association Conference, San Diego, August 1982.

package. Examples of the analysis of split-plot repeated measures data are given in Cochran and Cox⁴ and Winer.⁵

Split-plot repeated measures design can also be applied in a number of other different situations in auditing research. Firstly, apart from the time factor, there is an array of other situational factors that affect auditors' internal control judgments. Factors such as noise, fatigue, experience, learning, firm affiliation and so on, can be studied using the split-plot repeated measures design outlined above. Secondly, because of the economy in subjects, the split-plot repeated measures design is useful in sequential experimentation where, having performed one experiment, the result can be reviewed, and if there is uncertainty or ambiguity due to confounding, experimental error or unexpected results, further experimentation can be performed to resolve the uncertainty or ambiguity. Thirdly, the design can be applied to almost every other internal control research involving more than five or six factors. Past experience (e.g.,

Choo and Eggleton; Joyce; and Ashton) has shown that certain higher order interactions can be assumed to be non-existent. Thus it is very useful for testing relatively large numbers of factors with a minimum number of subjects through fractional replication of these factors at the expense of higher order interactions. Finally, the design can be used in auditing research where it is not possible to administer all factor combinations with each set of subjects. Situations often arise in auditing research in which all the factor combinations can be administered to only one set of subjects at a time. At a later time, or possibly at a different location, another set of subjects receives the same factor combinations. Differences among sets of subjects represent a time or place variable (treated as extraneous factor) in addition to individual differences. The analysis of the data by a split-plot repeated measures design permits the isolation of the time or place variable.

⁴Cochran, W. G. and G. M. Cox, *Experimental Designs* (Wiley, 1957), pp 299-302.

⁵Winer, B. J., *Statistical Principles in Experimental Design* (McGraw-Hill, 1971).

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A Note on the Relationship between Age, Experience, Cognitive Styles and Accountants' Decision Confidence

F. A. Gul*

Introduction

Several writers have identified the attributes of age and experience as determinants of information processing abilities (Kirchner, 1958; Weir, 1964). With regard to age, Taylor (1975) asserts (p. 74):

One attribute of a decision maker which has been found to be instrumental in determining information processing ability is age. Age has been said to contribute heavily to both the manner in which a decision is reached and decision quality.

Experience is another demographic variable that has received widespread attention but with mixed results (Solivic, 1972; Taylor, 1975; Ashton, 1974; Weber, 1978). Practitioners often claim experience to be an important determinant of decision making quality (Weber, 1978, p. 372). Researchers have also identified psychological variables as an important influence on decision making (Dermer, 1973; MacCrimmon and Taylor, 1976; Jackson and Paunonen, 1980). In particular, cognitive style, which can be defined as a self-consistent way of functioning that an individual exhibits across perceptual and intellectual activities (Doktor and Hamilton, 1978, p. 885), has been identified as a 'potentially productive approach' for fruitful accounting research (Pratt, 1980, p. 502). Prior accounting studies that have examined the effects of cognitive styles on decision making have produced mixed results (Lusk, 1973; Benbasat and Dexter, 1979; McGhee, Shields and Birnberg, 1978).

Objective of this study

The objective of this exploratory study was to obtain some preliminary evidence on whether age, experience or cognitive style accounted for differences in decision confidence. Decision confidence, which was the only dependent human information processing variable investigated, can

be defined as the self-rated confidence in the correctness of the decision (Taylor, 1975, p. 77). It is analogous to Cox and Bauer's (1964) definition of 'specific self confidence' as 'confidence in performing a specific task or in solving a specific problem'. Decision confidence performs a major role in information acquisition and decision making. Weber (1978), who investigated decision confidence as an aspect of decision making quality (p. 372), requested subjects to rate their decision confidence on a ten-point scale (p. 374).

The field dependence (Witkin *et al.*, 1971) cognitive style was selected for study since it has attracted the attention of other accounting researchers (Lusk, 1973; Benbasat and Dexter, 1979) and found to be useful in explaining decision making behaviour. Based on the evidence provided by Witkin and Goodenough (1977, p. 662) it is hypothesised that accountants who are relatively field dependent (or 'global') are likely to make decisions more confidently than their relatively more field independent (or 'articulated') counterparts when provided with ambiguous type information. The understanding of how individuals of different cognitive styles may influence information-use behaviour is not only of academic interest. Benbasat and Dexter (1979, p. 736) predicts that such studies could lead to better information system designs based on an understanding of the users' characteristics.

Methodology

A laboratory methodology was employed with volunteer accountants as subjects (N = 54) drawn from a cross-section of accounting firms in Brisbane, Sydney, and Melbourne. Subjects were administered the 'Excellent Electronics Company' case study developed by Flamholtz (1974) which is made up of two parts. The first part of the case (A) contained only conventional accounting information while the second part contained Human Resource Accounting (HRA) information which has been identified as ambiguous type data (Oliver and Flamholtz, 1978, pp. 142-143). On this basis sub-

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Table 1
Simple Correlations between Age, Experience, Field Dependence and Decision Confidence

	Age	Experience	Field Dependence	Decision Confidence
Age	1.00	0.85**	0.20*	-0.15
Experience		1.00	0.10	-0.24**
Field Dependence			1.00	0.29**
	*significant at 10%		**significant at 5%	

jects were requested to make certain decisions on the personnel layoff problem and rate their confidence on the decision they had made after each part of the case. Following the method adopted by Oliver and Flamholtz (1978),¹ decision confidence was measured from 0 (total uncertainty) to 100 (complete certainty). Since one of the major hypotheses of this study is that subjects who are relatively more field dependent are likely to make more confident decisions as a result of ambiguous type data, it was appropriate to use the decision confidence scores after the second case which contained HRA data (or ambiguous type data) as a measure of decision confidence.

Subjects were also requested to state their age and experience since qualifying as a professional accountant. In addition to the cases, subjects were administered the Embedded Figures Test or EFT (Witkin *et al.*, 1971) to determine their level of field dependence.

Results

Simple (zero order) correlations were computed to determine the relationship between age, experience and field dependence and decision confidence. Field dependence was measured in terms of the time taken on the EFT. The longer the time the more field dependent the subject. The correlations between the variables are reported in Table 1.

As expected, age was highly correlated with experience (0.85). There was a low positive correlation (0.20) between age and field dependence. A low negative correlation was found between age and decision confidence (-0.15). Similarly experience and decision confidence were also found to be negatively correlated (-0.24). Field dependence on the other hand was shown to be positively correlated (0.29) with decision confidence.

The fact that age, experience and field dependence were correlated suggests that they could have some influence on each other. In order to eliminate the effects of a third and fourth variable

upon any two variables being correlated, second order partial correlations were calculated. In a sense the use of partial correlations is a statistical substitute for experimental control (Guildford, 1965, p. 341). The correlation between age and decision confidence, for example, may be influenced by experience and/or field dependence. There is thus a need to rule out the influence of experience and field dependence in order to examine the relationship between age and decision confidence. This is achieved by the technique of partial correlation.

As reported in Table 2 there was no systematic relationship (0.06) between age and decision confidence when the effects of experience and field dependence were nullified. A significant low negative correlation (-0.19) was found between experience and decision confidence. This correlation level, though rather weak, has been identified as showing some systematic relationship (Huck, Cormier and Bounds, 1974, p. 31). The result is consistent with Taylor's (1975) findings where length of management experience was found to be negatively correlated with decision confidence. The significant low positive correlation between field dependence and decision confidence (0.18) provides some support for the hypothesis that field dependent accountants were likely to make more confident decisions.

In addition to correlation analyses the data for field dependence and decision confidence was analysed with the Kruskal-Wallis 1-Way (K-W) anova following the recommendations of McCall (1970, pp. 205-207). The K-W test was also appropriate since field dependence can be conveniently classified into three major groups. The mean EFT score was approximately 29 and the standard deviation (SD) was approximately 12. Following the method recommended by Furnham (1981), scores of $\pm \frac{1}{2}$ SD were classified as moderately field dependent while scores above 35 and below 23 were classified as highly field dependent and field independent respectively. The results as reported in Table 3 show that there was a significant difference ($\chi^2 = 6.53$, $p \leq 0.05$) in decision confidence between field dependent and field independent subjects with field dependent accountants showing higher decision confidence.

¹In this study if subjects reported an increase in confidence after the information in the second case the HRA information was considered useful because it reduced uncertainty.

Table 2
Second Order Partial Correlations between Decision Confidence and
(i) Age, (ii) Experience, (iii) Field Dependence

<i>Between Decision Confidence and:</i>	
(i) Age with experience and field dependence removed	0.06
(ii) Experience with age and field dependence removed	-0.19*
(iii) Field dependence with age and experience removed	0.18*
*significant at 10%	

Table 3
Kruskal-Wallis 1-Way Anova Field Dependence and
Decision Confidence

	<i>High Field Dependence</i>	<i>Moderate Field Dependence</i>	<i>Low Field Dependence</i>
Number (54)	20	20	14
Mean Ranks	33.47	27.08	19.57
Corrected for ties chi square: 6.53*			
*significant at 5%			

The results are not entirely consistent with Weber's (1978) study where he found a 'lack of pervasive influence of the psychological and demographic variables on decision making' (p. 386). This seems to be the case for the variable age but the variable experience may have some influence on decision confidence. Moreover field dependence is shown to be related to decision confidence as shown in Table 3.

Conclusions

This exploratory study has provided some preliminary evidence on the relationship between age, experience, cognitive style and decision confidence. The results obtained here indicate that age was not related to accountants' decision confidence. However experience was found to be negatively correlated with decision confidence: the more experienced the accountant the less decision confidence displayed. Ironically the results suggest that experience may be an important determinant of decision confidence but not in the predicted direction, that is, the more experienced the accountant the higher the decision confidence. A significant correlation between field dependence and decision confidence was found. Second order partial correlations confirmed the hypothesis that there was a relationship between field dependence and decision confidence. The results of the K-W test provided evidence to support the hypothesis that field dependent accountants made more confident decisions than field independent ones when exposed to ambiguous type accounting information. In interpreting the results of the study it should be noted

that the partial correlation results were rather weak. This in itself suggest a need for further research. In addition, the results on the relationship between field dependence and decision confidence are supportive of calls for further accounting research into cognitive styles.

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Accounting History Society

Peter Boys has recently taken over the editorship of *Accounting History*, the journal of The Accounting History Society. He would be pleased to receive any articles or other items of interest for possible publication in *Accounting History*, and to learn of anybody interested in becoming a member of The Accounting History Society. Please address any correspondence to: P. G. Boys, Keynes College, The University, Canterbury, Kent, CT2 7NP, UK.

Walter Taplin Prize

The Association of University Teachers of Accounting, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £100 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin. The winning article in 1981/82 was 'The Accuracy of Chairmen's Non-quantified Forecasts: An Exploratory Study' by Anthony Steele (Summer 1982).

The French 'Comptes d'Ordre'*

Vassilios P. Filios

Suspense accounts, or accounts of temporary transition, are those which show amounts that for various reasons cannot appear at once in the account to which they belong regularly and definitely. Thus, for instance, a business may receive an amount of money and does not know, for the time being, the customer who pays. A suspense account is opened until the customer who has paid is determined. Suspense accounts are used when an accounting event presents a temporary suspension or vagueness as far as one of the accounts affected by the event is concerned. As soon, however, as the suspension or vagueness is removed and the complete as well as definite determination of the appropriate account to which the temporarily posted amount belong is made, the amount is transferred to the appropriate account.

A contra, offset, or valuation account is an account for decreases of a specific kind, and for a rather long period, on another account, the decreases being shown separately for greater emphasis. Such an account is in essence a table which shows the intertemporal changes of a variable which can be positive (an asset) or negative (a liability) for an enterprise's calculations. (In German it is called a *Wertberichtigungskonto*.) Thus, for instance, a fixed asset account has as its contra account, the accumulated depreciation account. As is obvious from this example, a contra account has a smaller or, at the most, an equal balance with its main account. Furthermore, a contra account can be unified again with the main account for the creation of the previously single account. The Financial Accounting Standards Board's Statement of Financial Accounting Concepts No. 3 defines valuation accounts as part of the related asset/liability accounts.

The suspense or permanent accounts which are used as transitions between real and personal accounts, or even replacements for them, are called in several Continental countries 'accounts for the sake of order' (*comptes d'ordre* in French). Such accounts facilitate the expression in a clear double-entry form of any corrections that should be made to the position of a company due to certain

anticipations and they are also useful for giving greater accuracy to inventorying by showing any post balance sheet events. These accounts attracted a lot of interest from accounting theorists in France and their historical development is briefly presented here. Such a development of certain views by the accounting theorists of some European countries on a specific kind of accounts is termed a 'specific theory of accounts.' The following specific theories of accounts have been developed:

- (i) Contra accounts;
- (ii) Intermediate and synthetic accounts;
- (iii) Memorandum and demarcation accounts (*comptes de engagements* or *comptes d'ordre*).

Suspense accounts have been defined as the items shown on the balance sheet, but not included in the balance sheet total, such as contingent claims or liabilities for other possible risks or claims, the mention of which is required by law in some countries. They are called in French *engagements hors bilan*, *comptes d'engagement* or more generally, *comptes d'ordre*.¹

Comptes d'ordre (*conti d'ordina* in Italian) constitute a peculiarity of French and Italian accounting systems as well as of those national accounting systems that are affected by these two. They are also called 'demarcation accounts.' Thus in Greece, for instance, where accounting practice is greatly influenced by French accounting, demarcation accounts are used extensively, and they are a distinctive class of accounts in the recently legislated Greek general accounting plan of 2 April, 1980. They are not, however, used in Anglo-American and German accounting practice. Furthermore, they are distinguished from other assets or liabilities, and they are usually shown after the totals of these in the balance sheet. The French author Pierre Garnier includes with the demarcation accounts those for contingent liabilities, calling them all *comptes hors bilan*, i.e., off-balance sheet accounts.²

It was H. Deschamps in 1908³ who wrote for the first time that those who wish to show the pos-

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¹This is the definition of the *Lexique UEC*, 1974, p. 361.

²Garnier, 1968.

³Deschamps, 1908, p. 429.

session of goods on consignment, because they are responsible for such goods, should record possession as follows:

Goods on consignment from H.D.
H.D., Goods on consignment

This seems to be the first clear suggestion of the need for demarcation accounts to reflect certain legal responsibilities not recorded by the book-keeping system and also show the economic effects of contracts in progress, orders on hand, etc. which had been ignored up to that time. Another early view of demarcation accounts delineates them as any transitory or clearing accounts (*transitorische Konten*) destined for short term settlement (in French: *comptes de régularisation*).⁴ Quesnot⁵ considers as demarcation accounts those which deal with 'expenditure to be eventually allocated' and, more generally, any accounts which imply later reclassification of their content (*changement de déclassement*). A few other authors identify demarcation accounts with contra accounts.⁶ Not until a few years before the Second World War were the nature, content and functions of these accounts finally clarified in accounting monographs and some textbooks which devoted specific chapters to this issue.⁷

The French authors Léautey and Guilbaut called them 'accounts of order and method.' Their function is the provision of statistical information, and they may be debited and credited either in monetary units or in other quantities. Accounts of order are mainly used for irreplaceable assets where their trustee or bailee must return them, not other similar assets or their equivalent monetary value (in which case the conventional accounting system is used). Thus, in expressing by double entry a unilateral contract where assets are received with an obligation to return them in due time to their owner, two contra accounts are used: an asset account, which shows the receipt of the 'asset' and a liability account which shows the responsibility undertaken for the return of the 'asset' to the bailor/depositor. Demarcation accounts of this kind are called in France *comptes d'engagement*, and are widely used in cases of legal acts and transactions which result from bilateral or unilateral contracts which do not provide for immediate delivery of goods purchased. Such accounts can be short, medium or long term in duration and since they delineate transactions in suspense they can be entered separately and in pairs, as in conventional double entry systems.

The accounts in question are also used in cases where a bilateral contract is cancellable, since their resolution is postponed. This would apply to a sale on approval, for example. The buyer can accept or reject the sale, express his decision within a specified time, or, in its absence, within a reasonable period to be specified by the seller. If the goods have been delivered, the silence of the buyer after this time is taken to mean acceptance.

There are many cases where demarcation accounts are recommended for use. Examples are: management of non-owned irreplaceable current assets (goods of third parties, securities of third parties, etc.); the existence of resulting obligations and rights under bilateral contracts; letters of guarantee for third parties; the existence of programmes and plans of management, even budgets.

Demarcation accounts can be classified into the following four categories:

1. Accounts which show stewardship of assets that belong to others, but which the enterprise possesses or manages temporarily.⁸ An example of an entry to these accounts is:

Goods of third parties

Third parties—assignors of goods

2. Accounts which show rights, responsibilities in general and liabilities resulting from already signed bilateral contracts, the execution of which is to start some time in the future.⁹

3. Accounts which define the limits of present entrepreneurial capabilities or delineate the framework of a company's operations, and show plans, targets, aims of an organisation.¹⁰ In the case of a bank, such an account would show the extent to which credit is justified by a customer's projects and profitability.

4. Accounts which constitute a memorandum of attributes of a company or its owners (*comptes de simples memoranda*, or *comptes aide-mémoire*). Thus accounts of this kind in the case of a partnership would be:

Specific knowledge of partner X (e.g. a formula)

X a/c of specific knowledge

In the case of unrecorded goodwill:

Goodwill

Capital from goodwill

⁸D'Alvice, 1931, classifies the assets which are managed but not owned by a company in three categories: (a) assets the use of which is allowed (*beni di uso permesso*); (b) assets the use of which is prohibited (*beni di uso vietato*); (c) assets the use of which is allowed under certain conditions (*beni di uso permesso condizionale*).

⁹De Louvet, 1939, devotes a long chapter to demarcation accounts.

¹⁰Morley, 1927, suggested long ago the use of demarcation accounts which would show operational plans within the budgeting systems of public utilities or municipal and governmental authorities. In certain cases a budgetary account of this kind will have to be legally authorised, at least insofar as the level of expenditure to be incurred is concerned.

⁴Demarchey, 1925, p. 36. Thielland, 1934, p. 45. For a very early view on the subject see also Léautey and Guilbaut, 1889.

⁵Quesnot, 1921, p. 18.

⁶For this very specific meaning see Simon, 1931, p. 55 and Chaveneau, 1926, p. 144.

⁷Belavista, 1935; Mihailescu, 1933; Jacobescu, 1923-25, Vol. I p. 60, Vol. II p. 58, 86, 104.

All these categories have been proven useful for entities which accept goods from third parties on consignment, and financial institutions which accept securities for collection on commission. In Italy, companies which undertake the management of portfolios insure them with insurance companies. As a matter of generally accepted policy, these companies show the fluctuating value of their portfolio in demarcation accounts since the, usually high, insurance costs depend upon this value. When a warehouse issues warrants (*réceptions*) to wholesalers, demarcation accounts are also used to show the obligations undertaken.

The 1947 French uniform chart of accounts placed claims and other obligations under warranties in class 0 (the class for demarcation accounts) and called them *statistical accounts*. The 1957 revised plan made them specific accounts and provided that they could appear either within the double entry system or outside it, in the form of a table and as a note to the balance sheet.

The revised General Accounting Plan prepared in 1979 by the National Accounting Council is to be made obligatory as from 1 January 1984. The revised Plan's technical mechanism has been widely distributed, taught and tested. The part which concerns *comptes d'ordre* is given in the appendix.

Appendix

Class 8: Specific Accounts

(According to the 1979 revision of the French General Accounting Plan).

- 80. Memorandum items outside the balance sheet.
 - 801. Engagements given by the enterprise
 - 8011. Endorsements, bails, guarantees
 - 8014. Bills circulated under the endorsement of the enterprise
 - 8016. Dues from leases which have not expired
 - 80161. Leased furniture and fittings
 - 80165. Leased land and premises
 - 8018. Other engagements given
 - 802. Engagements accepted by the enterprise
 - 8021. Endorsements, bails, guarantees
 - 8024. Discounted debts which have not yet matured

8026. Engagements accepted for utilisation of leasings

80261. Leased furniture and fittings

80265. Leased land and premises

8028. Other engagements accepted

81 to 85. Accounts to be used for the consolidation of the balance sheets and the profit and loss accounts*

86. Goods and services exchanged between companies (revenue charges), analysis as for the accounts of class 6

87. Goods and services exchanged between companies* (operating income), analysis as for the accounts of class 7

*For companies belonging to the same group.

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Book Reviews

Advanced Management Accounting. Robert S. Kaplan. Prentice-Hall, 1982. xvi + 655 pp. £22.

Kaplan's book represents both good news and bad news for management accounting. It is an ambitious attempt to meet an embarrassing need for an advanced text on management accounting. This objective is largely achieved—this is the good news. The bad news is that we are no nearer to being provided with a coherent theory or, if you like, a conceptual framework for management accounting. Kaplan has been unable to extricate himself from the shackles of the tradition which views management accounting as a cornucopia of techniques, of answers seeking problems.

Advanced Management Accounting reflects Kaplan's interest and expertise in quantitative methodology. This is understandable—at this level it is very difficult to be a generalist and any comparative advantage must be exploited. However, it is difficult to view Kaplan's complete omission of the behavioural literature with similar sympathy. There may have been a time when behaviouralists in the accounting area were guilty of a lack of rigour, but this is no longer true. A management accounting text without behavioural input is like the tin man in *The Wizard of Oz*—clinically efficient but with no heart. Kaplan's omission is ironic as he is from Carnegie-Mellon University, which has a long and distinguished behaviouralist tradition. There is a similar neglect of management information systems issues.

One gets the flavour of Kaplan's quantitative emphasis from the Introduction where he has a section on information economics. He then proceeds to three chapters on cost behaviour which appear to accept definitions of 'cost' and costing terms to be non-controversial and do not expose the student to the 'theory of cost' as reflected in the writings of R. H. Coase, R. S. Edwards, J. M. Buchanan and other economists. Then follow chapters on cost-volume-profit analysis under certainty and uncertainty, and pricing. In keeping with the book's tenor, goal programming could have been introduced in these chapters as an approach to tackling the problem of multiple objectives. After a chapter on opportunity losses (based on decision theory) Kaplan plunges into four chapters which represent his forte: two on variances and two on cost allocation. There is no mention of standard costing and budgets in these chapters! Also, suprisingly, given his orientation, Kaplan makes no reference to the large number of

recent writings on the subject of cost allocation using a game-theoretic approach.

There follow three chapters on divisionalised firms. The chapters on transfer pricing and investment centres do not add much to existing texts such as C. T. Horngren, *Cost Accounting: a Managerial Emphasis* and J. Dearden, *Cost Accounting and Financial Control Systems*. There was an opportunity here to update Solomons' classic work on the subject. At this level a study of transfer pricing economics through graphs is helpful for a sound grasp of this much misunderstood problem. The treatment by means of discussion and example, as in this book, tends to be cumbersome and less effective. If the author thought that this was tangential to his main thrust, a synopsis could have been put in an appendix as Horngren usefully does. The chapter on decentralisation is good but lacks input from organisation theory, e.g. from J. W. Lorsch and S. A. Allen, *Managing Diversity and Interdependence*.

The final two chapters are concerned with incentives and form the *pièce de résistance* of the book. The chapter on executive contracts and bonus plans is excellent but rather short. Given that management accountants are often involved in the design and operation of bonus schemes, it is surprising that the mainstream management accounting texts do not include such a chapter. In the final chapter on formal models in budgeting and incentive contracts, Kaplan demonstrates the relevance to management accounting of recent research in economic theory in general and agency theory in particular. This is a competent attempt to review a rapidly moving research area. A minor criticism is that Kaplan chose to draw his chapter almost exclusively from Jennergren's partial survey of agency theory and related literature on incentive schemes; this results in some notable omissions. It is to Kaplan's credit that he has not included this chapter merely as an afterthought as so often happens when new ideas are introduced in textbooks. He has attempted to integrate the sometimes abstract analysis of agency theory into earlier chapters—for instance, those on decentralisation, executive contracts and bonus plans, and in the Introduction.

Advanced Management Accounting deserves to be included as the primary text on management accounting courses on Masters and Doctoral programmes (with appropriate supplementation from the behavioural and management information systems literature). It is well written in Kaplan's fluid

style and with a wealth of practice material. There is a fine balance of 144 problems and about 18 case studies (with a large amount of new material), both being well thought out and well related to the chapters they follow—this feature will make the text very attractive in the classroom. (In fact the book is clear proof of the benefits of having had draft chapters tried out on students.) The bibliography at the end of each chapter is of optimal length and is up to date. A word of advice to those behaviourally-orientated and those of non-quantitative inclination: do not be discouraged by the mathematics in this book because it has a lot to offer.

In conclusion, one feels that the book could more appropriately have been entitled *Advanced Management Accounting: a Quantitative Emphasis*, and in this context it is interesting to note the following view expressed in *The Accounting Journal* (Winter 1977–78) by the author: 'At this time, the (quantitative) models have gotten ahead of the problems and we could use a consolidation phase to evaluate the practicality and payoff of what has already occurred and to learn what important remaining problems have not been addressed to date'. *Advanced Management Accounting* does not, unfortunately, represent such a 'consolidation phase'.

The hard cover version being rather highly priced at £22, students will look forward to a consumers' surplus in the paperback version.

The London School
of Economics and
Political Science

Nandan Choudhury

Cost Accounting. *Kenneth S. Most and Ronald J. Lewis.* Grid Publishing Inc., 1982. xii + 606 pp. \$26.95.

This book is aimed at the (US) 'junior-year accounting major who is studying cost accounting as part of an undergraduate accounting program, and the graduate student in a professional accounting program at the master's level' (p. xi). Notwithstanding the authors' claim that the book is 'both theoretical and practical' (p. xi), the content consists predominantly of descriptions of practical cost accounting procedures rather than of attempts to analyse, evaluate or conceptualise them. In other words, this is a typical North American undergraduate text: long on procedural descriptions and short on analytical content. As with other such texts, it illustrates clearly the dichotomy between the research work of leading US academics, which is often rigorous and analytical, and the content of US undergraduate accounting degree courses, which is often neither of these things. US

degree courses are usually geared towards the short-term practical aspects of a professional accountancy career, in sharp contrast to the philosophy adopted in most UK accounting degree courses, where a longer-term and more analytical orientation is generally favoured. It is to be hoped that this is one US practice that we in the UK do not attempt to emulate!

The book comprises sixteen chapters and few surprises in terms of content. For example, break-even analysis, cost analysis, responsibility accounting, budgeting, standard costing, variance analysis and performance evaluation are described thoroughly. Each chapter contains numerous illustrations and end-of-chapter cases and problems. By and large, the descriptions of what the authors perceive as extant practice (although there is little justification provided for their perceptions) are extensive but uncritical. Even where existing procedures are criticised, the criticism lacks conviction. For example, in Chapter 5 fixed cost allocations are criticised as being arbitrary, but then follow detailed descriptions of numerous alternative methods for undertaking such allocations. The justification for this treatment is contained in such unsubstantiated assertions as: '...cost accountants have developed a set of techniques that have proved themselves in practice even though lacking in theoretical justification' (p. 137). Equally frustrating is the treatment following the statements: 'Now the [fixed overhead] volume variances are measures of the loss or gain experienced through under- or over-producing in relation to the budget on which the standard overhead rate was based. Note that they are not *the* measures—in the last analysis, the loss or gain can only be determined in terms of opportunities taken or foregone' (p. 360). In spite of this recognition of the limited usefulness of fixed overhead variances, the authors are unable to resist the temptation to include such variances in subsequent illustrations of variance analysis without further reference to their limitations.

There are some chapters which do include attempts at critical evaluations of the methods described. Unfortunately, these evaluations tend to be the weakest parts of the book. Chapter 14 contains an introduction to capital budgeting, including several attempts at critical analysis. The result is such classics as: 'Because of the uncertainties involved in looking so far ahead, capital budgeting abandons the subtleties of accrual accounting and uses cash flow estimates' (p. 438); 'The IRR would appear to be more useful for capital budgeting decisions than the NPV. . . . The IRR is capable of giving clearer indications than the NPV in preference decisions. . . . Most investors would prefer an investment producing a 30 percent annual return (on an investment of \$10,000) to one producing a 15 percent annual return (on an investment of



\$1,000,000)' (p. 496). It could be profitable to meet such investors! And finally: 'Each capital expenditure stands on its own bottom' (p. 497). (This could be a typographical error, but apparently is not!)

In addition to its lack of a critical theoretical underpinning, the book suffers some irritating omissions. There is no bibliography to afford interested readers the opportunity to follow up areas which interest them or to read the original articles on which some of the text material is based. The authors' justification that 'recommended readings tend to be a matter of personal preference and run the risk of becoming out-of-date' (p. xi) lacks conviction as it could equally be applied to the entire contents of the book! Also there is no concluding or summary chapter which might have served to pull together the various strands of the book and which could have helped to clarify the overall framework.

Because of its North American orientation and its lack of critical content, this book is unlikely to be of much use to UK accounting undergraduates. Perhaps it is unduly harsh to criticise an American book for its failure to meet the needs of the UK market. A fairer test might be to compare it with the recognised North American market leader in this area, C. T. Horngren, *Cost Accounting: A Managerial Emphasis*, 5th Edition (Prentice-Hall, 1982). Here again, it has to be said that Professors Most and Lewis come out second best. Their book lacks the snap, freshness and analytical content of Horngren. Furthermore, their end-of-chapter examples (which are largely drawn from the examination papers of US professional accountancy bodies) lack the depth, interest and rigour of Horngren's (many of which are written by himself and colleagues for Stanford undergraduate and graduate courses).

The book does contain one startling revelation. In discussing joint product costs, the authors state: 'Although allocation is inherently based on judgement and, in many cases, arbitrary assumptions, it is, nevertheless, necessary and useful' (p. 449). Subsequently, and following the same line of argument, they reveal: 'Without these aids to rational decision making (uniform cost accounting systems), capitalism would not have survived . . . ' (p. 455). Obviously marginalists offer as great a threat to the free world as do communists!

University of Manchester

John Arnold

Principles of Corporate Finance. R. Brealey and S. C. Myers. McGraw-Hill, 1981. xxii + 794 pp.; £13.75 HB, £10.95 PB.

Instructors' Manual (by the same authors) 644 pp.; and **Study Guide.** C. A. D'Ambrosio and S. D. Hodges. ix + 321 pp. £6.50.

From page 2, on which the financial manager is described as an intermediary between the firm's operations and the capital markets, to the 'five most important ideas in finance' on page 732, the authors consistently present an efficient market view of business finance—the result will undoubtedly prove the most successful text for some years to come.

Brealey and Myers have boldly set out to redesign the structure of textbook-linked courses by starting with a lengthy discussion of net present values; indeed over a third of the book (parts two, three and four) is devoted to capital budgeting principles. Parts five, six and seven cover long-term financing (dividends, capital structure, debt and leasing), whilst a brief part eight contains short-term financial decisions, with a novel (but consistent) disregard for the traditional treatment of ratio analysis. The remaining parts of the book present selected 'issues': financial planning, mergers, international finance and pensions; and the authors conclude by discussing important concepts and 'unsolved' problems in the finance literature.

Apart from consistency of view, the most obvious feature is the style of the discussion, which is informal and aims to explain rather than to prove the models covered in the text. The approach works best in market oriented topics such as the Modigliani-Miller view of capital structure, since Brealey and Myers are satisfied to show how the cash flows from owning debt and equity can be equated, by shareholders' investment and deposit-making decisions. This treatment contrasts strongly with the heavy algebraic 'proofs' and numerical examples of capitalisation rates and arbitrage-corrected disequilibria commonly presented in traditional texts. Given the emphasis on efficient and frictionless markets, it is not surprising that portfolios and the Capital Asset Pricing Model (CAPM) are stressed in discussion; indeed the authors state that one of the most important ideas in the book is that '... the risk of a well diversified portfolio depends on the market risk of the securities included in the portfolio' (p. 126). Other central ideas include a predominant emphasis on net present value, the principle of value additivity of cash flows, and an evangelical belief in the potential of option pricing theory to solve problems of valuing corporate debt instruments. Although the book is refreshingly clear in discussing topics such as bankruptcy, it does not achieve this clarity without cost. In some cases the cost is that of glossing over difficult conceptual issues, in others, objections and qualifications are ruthlessly ignored. In discussing multi-period projects, the authors conclude that the CAPM-derived risk adjusted rates will usually be 'reasonable', but do not reveal (other than in the instructor's manual) that the necessary assumptions include constant and known beta and a risk-free

rate of interest. Similarly they dismiss Roll's destructive critique of CAPM test by admitting only that the '...market portfolio should include all risky investments, whereas most market indexes contain only a sample of common stocks' (p. 148).

Other deficiencies in their frictionless market approach are evident when they discuss topics which do not fit easily into a market view. Most strikingly the treatment of financial planning contains a journalistic account of the financial history of Burmah Oil; the treatment is consistent in that it takes a market view, or at any rate a shareholder's view, of the company but reveals nothing about the type of financial planning *actually* undertaken by Burmah. After arguing that most financial planning models are the concern of accountants rather than financial managers, the authors promote a linear programming model to integrate financial and investment decision making.

The text is tailor-made for one-year post-graduate courses—ideal for, say, MBA students who are looking for usable techniques. The book will also be adopted on professional and management oriented courses, even though it discusses a number of models and issues which do not yet appear in professional syllabuses. With undergraduate courses, it is difficult to identify the level at which the book may be used; it lacks the UK institutional material required for an introductory course, yet it does not smoothly prepare students for direct reference to the current articles often used in advanced undergraduate studies. With this qualification, the book is strongly recommended as a model of clarity in style and content. Its pedagogic value is enhanced by the accompanying instructor's manual and study guide but would be further boosted if the publishers were to produce a paperback edition.

University of Lancaster

C. W. R. Ward

New Zealand Company Financial Reporting: 1982.
J. B. Ryan, C. T. Heazlewood, B. H. Andrew and
M. A. Perkinson. 1982. 256 pp. NZ\$19.50.

Most of the major English speaking countries have produced occasional surveys of published financial statements, and we can now add to that list a three-year survey of 100 major New Zealand companies covering the years 1976/7 to 1978/9. There has unfortunately been a considerable delay in the

publication of this book, although it is nevertheless interesting and valuable to compare and contrast developments in New Zealand with other English-speaking countries. It is, however, rather misleading to include 1982 in the title of the book when the latest financial statements analysed are those for periods ended on or before 31 March 1979, although a supplementary booklet is provided of extracts from published accounts for 1980/81.

The stated objective of the book is to 'disclose the extent to which the accounting practices employed by companies in their financial statements are in accordance with the Statements of Standard Accounting Practice issued by the New Zealand Society of Accountants'. The content of the book is therefore strongly influenced by the 13 accounting standards that were issued in New Zealand before the end of 1981. Most of the more controversial areas of accounting are covered on this list, although New Zealand—like most other countries—has had difficulty in finalising statements on foreign currency and inflation accounting (a standard on inflation accounting was issued in March 1982 after this book was completed).

The overall impression obtained is that the state of financial reporting in New Zealand is still very similar to that in the UK. This is perhaps not wholly unexpected as there are many UK subsidiary companies in New Zealand, although it might have been expected that more substantial differences would have developed in recent years. The UK accountant visiting New Zealand (as I did in 1981 for six months) is therefore likely to have very few difficulties in understanding the form and presentation of local financial statements, although a small number of problems may arise because of slight differences in company legislation and accounting standards.

In the future it does seem inevitable that the number of differences between UK and New Zealand financial reporting practices will increase because of the requirements of the EEC Fourth Directive, which have now been incorporated into the UK Companies Act 1981. In particular, it seems extremely unlikely that New Zealand will move in the direction of compulsory formats for published accounts which will affect UK financial statements from 1983/4 onwards. Future editions of this book are therefore likely to report more significant differences between UK and New Zealand practices.

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Volume 14 No. 53 Winter 1983

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Each table and figure should bear a number and a title and should be referred to in the text. Sources should be clearly stated.

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References should be listed at the end of the paper and referred to in the text, as, for example, (Zeff, 1980). Citations to institutional works should if possible employ acronyms or short titles. If an author's name is mentioned in the text it need not be repeated in the citation, e.g. 'Whittington (1982, p. 6) states ...'

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Accounting Standards Steering Committee (1975), *The Corporate Report* (1975)

Edey, H. C. and B. S. Yamey (eds.) (1974), *Debits, Credits, Finance and Profits* (London: Sweet & Maxwell, 1974)

Lee, T. A. (1983), 'A Note on Users and Uses of Cash Flow Information', *Accounting and Business Research*, Spring 1983.

Style and spelling

Abbreviations should be written as, for example, FASB and not F.A.S.B. Words such as 'realise' should be spelt with an 's' not a 'z'. Single quotation marks should be used, not double.

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Forthcoming Articles

Articles which have been accepted but not yet published include those listed below (in alphabetical order by author):

- G. S. Archer and K. V. Peasnell, Current Cost of a Quoted Long-Term Liability. A Comment.
John Arnold and Peter Moizer, A Survey of the Methods Used by UK Investment Analysts to Appraise Investments in Ordinary Shares.
John Arnold and Peter Moizer, Share Appraisal by Investment Analysts. A Comparison of the Techniques Used by Portfolio and Non-Portfolio Managers.
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Michael J. Barron, Microcomputers, Financial Statement Analysis and the Data Needs of Financial Analysts.
Sasson Bar-Yosef and Joshua Livnat, Auditor Selection: An Incentive-Signalling Approach.
Ahmed Belkaoui, The Effects of Diagnostic and Redundant Information on Loan Officers' Predictions.
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S. J. Gray and C. B. Roberts, International Accounting Education. A Survey of University Courses in the UK.
Roger Groves, Michael Poole and Paul Broder, Professional Commitments of Practising Chartered Accountants in Modern Britain.
J. C. Higgins and E. J. Opdebeeck, The Microcomputer as a Tool in Financial Planning and Control. Some Survey Results.
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Trevor Wilkins, A Behavioural Investigation of Alternative Methods of Financing Capital Acquisitions and Lease Capitalisation.
David J. Williams, Operating System Audits. Their Importance and Use.
Jack Woodham, CCA—A Proposal for Reform.

In Defence of Profit Measurement: Some Limitations of Cash Flow and Value Added as Performance Measures for External Reporting*

D. A. Egginton

The problems of profit measurement have been so extensively analysed and debated that there can be few accountants who would be prepared to defend any measure of profit without at least some reservations. Consequently, it is not surprising that proposals should be made for approaches which are intended to displace profit as the central measure of business income in corporate reports. Two such alternatives have received considerable attention in the UK during the past decade, although their possibilities for supplanting profit have not aroused the same level of interest in other countries.¹ Under these approaches corporate reports would give prominence to statements of cash flow (alternatively referred to as 'cash flow accounting' or 'cash flow analysis', henceforth abbreviated to CFA) or to statements of value added (henceforth VA).

CFA and VA differ greatly in their objectives and methodology, but they share three important features which make it legitimate to consider them in association with each other. The first and crucial feature for present purposes is that they have been

powerfully advanced as *performance measures* (e.g. Lawson, 1975, p. 3; Lee, 1981a, p. 63; Morley, 1978, p. 2). Performance may have different interpretations, but it will be assumed here that a measure of corporate performance indicates the extent to which a company (and particularly its management) has augmented or depleted the resources entrusted to it. Since performance measurement would be regarded by many people (including the present writer) as the central function of profit in corporate reports, it would seem that the use of CFA and VA as performance measures would make them contenders to usurp rather than to supplement the role of profit. It is with this potential use of CFA and VA, to take over the role of profit measurement in corporate reports, that this paper is particularly concerned.

Another common feature of CFA and VA is that both have been predominantly advocated as flow statements with relatively little attention devoted to the consideration of an interrelated position statement (although proposals of considerable significance for CFA have recently been made by Lee (1981b)). In contrast, the importance of the articulation of the profit statement with the balance sheet is well known.

The third feature which links CFA and VA is that it has been suggested in both cases that they provide a means of reducing the ownership emphasis which is inherent in the profit statement. Whether that is true of the usual presentations of CFA, and whether VA's reduction in ownership emphasis is desirable, are both open to question.

These features provide the focus for this consideration of CFA and VA. The conclusions will suggest that neither CFA nor VA is suitable to displace profit from its central role as a measure of business performance in corporate reports. However, this does not carry any implication that cash flows or value added reports are unsuitable for other roles, and in particular it is recognised that

*This is a revised version of a paper presented to the South West Accounting Group of the Association of University Teachers of Accounting on 17 September 1982. The constructive comments of the discussant Professor R. H. Parker and other participants at the Conference, those of Professor Philip W. Bell and my colleague J. J. Forker, and the helpful suggestions of the anonymous referee for *Accounting and Business Research*, are all gratefully acknowledged.

¹Of course interest in cash flow information which is intended to be additional to profit statements, rather than a substitute for them, has been widespread. In the USA it has reached the level of official interest (FASB, 1980; Burton, 1981) and has been the subject of proposals for modifying conventional historical cost accounts to integrate cash flow information (Ijiri, 1978; Ferrara, 1981). However, Ijiri (1979) provides a cash flow proposal for 'bypassing the conventional earnings concept'.

In the case of value added statements, there has been a growth in the inclusion of such statements in annual reports or social/employee reports in countries of the European Community (Gray and Maunders, 1979).

cash flows might usefully replace the working capital approach to funds flow statements.

CFA systems and profit alternatives

The characteristics of CFA systems have been widely demonstrated in the literature, and Lee (1981a) provides a succinct survey of some 50 articles which have been published on this topic in recent years. For the present purposes it is only necessary to draw attention to certain major aspects of CFA.

In the words of Lee (1981a), p. 68, 'CFA is ... conceived as a multipurpose reporting system, compatible with the decision and accountability aims usually associated with conventional allocation-based reporting systems'. CFA essentially summarises the receipts and payments that go through a firm's bank account (although that does not provide an unequivocal definition of cash transactions, since the cash pool could be defined to include a variety of short-term securities).

In the Lawson and Lee systems, cash flows are classified into a number of components, of which the major elements are:

N = net cash flow from operations

R = replacement investment
G = growth investment

} separated by
Lawson but
a single in-
vestment
amount in Lee's
system

T = taxation

I = interest on borrowings

D = distributions to owners

E = new equity receipts

B = borrowings

C = residual change in cash resources
of the period

Lawson (1975, 1981) distinguishes in his system between replacement and growth investment, and emphasises the distributed (or distributable) cash flow to owners along the lines of:

$$N - R - G - T - I + E + B - C = D \quad (1)$$

Considerable importance is attached to the significance of the operating flows element N, thus:

It is suggested that the financial performance of any organisation, whether publicly or privately owned, ought to be measured in terms of the disposable income or net surplus which it can generate from its trading and productive (or service) activity ... (Lawson (1975) p. 3)

Lee does not venture into the distinction between replacement and growth investment; instead capital expenditure comes under a single heading

(shown here as $[R + G]$). His presentation varies but tends to emphasise the cash residual, for example (1972):

$$N - [R + G] - I - T - D + E + B = C \quad (2)$$

or (1981c):

$$N - [R + G] - I - T - D = F \quad (3)$$

where $F = C - E - B$, representing the residual financing change during the period.² Thus F shows the extent to which the firm's transactions were financed from internal activities (positive F) or financed out of cash balances and/or external sources (negative F), and can be regarded as an overall cash surplus or deficit for the period.

In some recent proposals Lee (1981b) links C to a statement of changes in net realisable values of resources. In effect the system is transformed from one which relies solely on cash flows to one which incorporates a profit measure—as a result of which, it will be argued, the system is improved.

In their systems both Lawson and Lee emphasise the importance of reporting both past and forecast cash flows. They adopt 10 years of past data and at least one year of forecasting data, although forecast periods of up to 10 years have been mentioned (Ashton, 1976). A number of other writers have also favoured approaches which would report both past and forecast cash flows, e.g. Briston and Fawthrop (1971), Jones (1975) and Climo (1976).

Lee (1981a) lists nine points that are 'merely a few' of the arguments for CFA, but at the risk of undue condensation the major elements are summarised under five headings below:

1. CFA *avoids dubious accounting allocations* which give rise to correspondingly dubious measures of periodic income.
2. CFA captures the vital factor in decision making and valuation of the *time value of money*; consequently, it is the only proper basis for measuring the value of entities as going concerns.
3. CFA emphasises the most fundamental and vital features of business activity: the *ability of the enterprise to pay its obligations, make distributions and provide for its future continuity*.
4. CFA is *objective, understandable and simple*.
5. CFA *does not require price level adjustments* because cash transactions reflect prices of the period in which they occur (although comparison between different time periods requires some general price level adjustment to a base period).

²Any of the elements F, C, E or B may be either positive or negative. Equity capital can, of course, be reduced in a number of ways. For the most recent provisions in the UK see the Companies Act 1981, sections 45–58.

If CFA is to be compared with profit measurement it is necessary to specify which profit concepts are being assumed, since an embarrassingly large number are available. For the present purposes just two extremes need to be mentioned. Conventional historical cost occupies the lower end and is in certain respects beyond the bounds of defensibility. Among its disabilities are its disregard for price changes and its questionable bases for allocating costs between periods. At the other end of the spectrum would be those current value accounts which adopt pure market values based on entry or exit prices for assets (second-hand where appropriate). Edwards and Bell (1961) provide the classic entry price system, giving an 'all-inclusive' measure of business profit, although their work also included a measure of realisable profit based on exit prices. Chambers (1966, 1967, 1970, 1974, 1975) provides the classic exit price system, usually referred to as CoCoA. Both of these systems overcome the price change limitations of historical cost profit. Both also offer 'all-inclusive' measures of profit which avoid certain allocation difficulties; in addition, Edwards and Bell provide a measure of current operating profit designed to separate operating profits from holding gains. However, current value accounts still give profit measures which reflect changes in separable asset values (and liability values in the Edwards and Bell scheme) rather than the change in value (in market or subjective terms) for the firm as a total organism.

CFA and the allocation problem

The claim that CFA avoids dubious allocation procedures has been the subject of a recent article by Rutherford (1982) and a riposte by Lee (1982). Rutherford's analysis of the allocation problems of CFA is countered by Lee, who concludes that '... allocation problems do not apply to CFA if proper care and attention is paid to the basics of accounting' (p. 351). Much depends on what is meant by the words 'allocation' and 'problems', but it will be argued that some form of allocation in accounting reports is almost inescapable and CFA is certainly not exempt.

The allocation definitions adopted by Lee will be followed here. Lee starts by quoting Thomas' definitions of allocations with approval and the broadest will be used:

'An allocation is any partitioning of a whole into parts, any division of a subject among objects.' (Thomas, 1980, p. 1).

Lee then usefully distinguishes between three types of allocation which will be defined for the present purposes as:

—*time period allocations* which match accounting data to particular periods;

—*classificatory allocations* which classify data under headings (e.g. operating/financing);

—*entity allocations* which assign data to specific entities or subdivisions of an entity.

The present concern is with reports for the entity as a whole. Thus Lee's entity allocations, involving traditional and intractable problems of joint cost allocations, can be conveniently ignored. However, issues of joint cost allocation can still arise in the reports of the entity as a whole, particularly for time-period allocation with regard to stock valuation.

On the question of time-period allocations, any accounting flow statement must allocate data along the time continuum in accordance with some criterion. For a cash basis of accounting the criterion is the point of time at which cash is paid or received. Thus a firm which buys a continuous supply of resources, such as telephone services, electricity or leased assets, would assign cash costs to the points of time (and therefore the time periods) when payment is made. This must qualify as allocation under the Thomas definition, since it involves a 'partitioning of a whole into parts'. Whether the allocation is to be considered dubious is a matter of judgment, and depends on the interpretation to be placed on the results of the allocation. If the purpose is to give information on resources consumed (harking back to the earlier definition to performance measurement) then cash allocation is clearly deficient, since consumption and payment are not identical. The allocation could be determined by events which have nothing to do with the consumption of services, such as postal delays in the delivery of invoices or manipulation of payment dates by management. Similar arguments might be developed for resources which are not supplied on a continuous basis, such as purchased goods, but it is enough for present purposes to have demonstrated that questionable assignments or 'allocations' would occur.

By contrast, accruals accounts, and corresponding profit measures, attempt to reflect the consumption of resources. The resulting time-period allocation problems over matters like stock valuation and depreciation are well known. It is legitimate to compare cash allocation with accruals allocation and argue that one method is more arbitrary (open to error or manipulation) than the other, or that one method yields results which are more informative to users, but it is not valid to suggest that one method can avoid the problem of time-period allocation altogether.

Similarly, CFA must entail classificatory allocations if the whole of a period's expenditure is to be partitioned into parts under different headings. Only if a flow statement showed total outflows as one amount and total inflows as another amount, or perhaps gave full details for every single item of

expenditure, could classificatory allocations be said to be avoided. Thus the CFA systems described earlier classified cash flows, and in particular distinguished between operating and investment flows. That distinction also carries implications of time-period allocation, since investment flows must be judged to bring benefits in future time periods (e.g. do research, advertising, or costs of long-term contracts qualify as investment flows?). The Lawson approach went further, and distinguished between replacement and growth investment. Such a division would seem to have potential interest for users, but it represents a classificatory allocation which requires consideration of the same sort of problems as replacement cost accounting for fixed assets (e.g. does replacement investment replace the same physical quantity or the same value of output, and over what time periods, when technology and demand are changing?).

Lee (1982) recognises that classificatory allocation causes problems for CFA, and concludes that the solution may be:

... not to treat [capital and revenue expenditure] as essentially different ... but instead ... to deduct all expenditure as one item (other than ... interest, taxation and dividends) from sales revenue and to ensure there are adequate supporting descriptions and explanations of all major expenditure headings within it (for example, raw materials, wages, overheads, plant, vehicles, research and so on). (Lee (1982) pp. 348-9)

In fact this would still not avoid the classification problem, because the suggested list of headings is merely another classification. For example, overheads and research would presumably include some wage payments to employees. If so, why are they not included with wages? The answer is presumably that the suggested classificatory allocation was considered potentially more informative to users. That is perfectly acceptable, and some such judgments on allocations are virtually inescapable if accounting reports are to convey information. It would seem that the only ways of entirely avoiding classification in flow reports would be either to report single totals for inflows and outflows or to give full details of every single item of receipts and expenditure.

Cash flows *ex ante*

The reporting of forecast cash flows is an integral part of the CFA systems outlined earlier. It is presumably the provision of such forecasts that Lee (1981a) has in mind when he suggests that 'CFA captures the vital factor in decision-making and valuation of the time value of money' (p. 72) and that 'CFA is the only proper basis for measuring the value of entities as going concerns

because of its attention to the time value of money' (p. 73).

The provision of forecast cash flows could, in principle, permit investors to discount at their personal rates of time preference to obtain a present value. However, it would also be equally possible in principle to discount profit forecasts to a present value. Peasnell (1982) has shown that 'any all-inclusive measure of profit (suitably adjusted) can be discounted back to economic value' (p. 379). Cash flows are not unique in their capacity to be discounted. Moreover, if the forecasts were sufficiently far-reaching, it would only be necessary to give investors dividend forecasts (including any liquidation payments); the detailed intermediate figures for either CFA or profit would be redundant.

The provision of any types of forecast can be valuable to users of accounts, although more as a guide to management perceptions than as a crystal ball. Forecasts couched in terms of alternative scenarios (for different potential economic environments) might be a great deal more informative than the single-valued estimates which are usually implied in CFA discussions. However, a reporting system which relied upon the discounting of forecast cash flows could be effective for valuation only if the forecast stream was both extremely long (i.e. captured all future elements materially affecting value) and the forecasts were regarded by investors as being reasonably reliable. These two conditions are not realistically compatible and that is recognised in the usual assumption of CFA systems that forecasts would be provided for as little as 12 or 18 months. Such a forecast period could not be contemplated as a basis for discounting, unless the initial forecast was quite unjustifiably extrapolated to later periods. Only an horizon of significantly more than a decade could be treated at all seriously *unless* some forecast closure value at the cut-off date is provided. But CFA, as a pure flow system, is not designed to provide such closure values. A forecast share price at the horizon might be an interesting possibility for the listed company, but is hardly appropriate for smaller entities.

The absence of closure values would mean that the comparison of forecasts with outcomes could have no clear significance for performance assessment. Assume, for example, that two companies have the following forecasts and results for cash surplus (residual change in cash resources; no dividends or equity changes):

	Periods				
	1	2	3	4	5
<i>Company A</i>					
Forecast	100	100	100	100	100
Outcome	100	100	100	100	100
<i>Company B</i>					
Forecast	150	150	150	150	150
Outcome	99	99	99	99	99

It is evident that A's *forecasts* are more accurate than B's, but the figures provide no basis for judging whether A's *performance* is better—because opening and closing valuations are unstated. In fact, it is relatively easy to think of situations in which A performed worse than B. For example, that would be the case if A had started with a valuation of 500 and ended with 50, whereas B started with 50 and ended with 500.

The adoption of the cash basis of time-period allocations in CFA can also cause difficulties in the interpretation of forecasts against outcomes. The upper section of Table 1 shows forecast and outcome CFA figures for a simple trading company which has no fixed assets or depreciation. It would seem from the CFA statement that the company did particularly well, exceeding the forecast operating flows by 40, doubling the dividend and increasing the cash retentions by 15.

The profit statement in the lower section of Table 1 shows a very different picture.³ Profit is down on forecast, and it would be very difficult indeed to argue on the evidence of the balance sheet in Table 2 that the company's position had improved compared with the forecast, which is the message of the CFA statement.

Now it may be argued that the result arises from running down debtors and increasing creditors, which could not persist over many periods; all will be revealed when the cash flows for the next year or so are reported. Such a view would ignore the fact that timeliness is crucial to accounting information; the interpretation of this year's figures cannot await next year's results. The basic case for using sales figures (and matched costs) for performance assessment rather than cash receipts is connected with this issue: it is because sales occur before receipts that they give an earlier indication of movements in trading. Such an argument does not carry any implication that the movements should necessarily be extrapolated; they must be interpreted in the context of other information about the company's prospects. Nor is there any suggestion that the collection of cash from sales is unimportant because it is secondary in a chronological sense to selling the goods. Both elements are important and both profit and liquidity information have parts to play in corporate reports.

It is relevant to note that in the USA the SEC is developing policies for disclosure relating to the company's expectations regarding sales, profits and liquidity. Thus:

... if internal company forecasts show any substantial deviation from the trend line fitted to past year's sales and income from continuing

Table 1
CFA Statement

	<i>Forecast</i>	<i>Outcome</i>
Sales receipts	370	400
Operating payments	(280)	(270)
Operating cash flow surplus	90	130
Taxation paid	(40)	(40)
Dividend paid	50	90
	(25)	(40)
Cash surplus	25	50
Profit Statement		
	<i>Forecast</i>	<i>Outcome</i>
Sales	380	375
Costs	(285)	(290)
Profit before tax	95	85
Taxation	(40)	(40)
Profit after tax	55	45
Appropriation:		
Opening retained profits	75	75
Profit after tax	55	45
	130	120
Dividend	(25)	(40)
Closing retained profits	105	80

operations, a disclosure obligation exists... (Burton, 1981, p. 56)

... the ability of an enterprise to generate adequate amounts of cash to meet the enterprise's need for cash... should be discussed on both a long-term and a short-term basis. (Burton, 1981, p. 58)

Table 2
Balance Sheet

	<i>Forecast</i>	<i>Outcome</i>
Capital	50	50
Retentions	105	80
	155	130
Creditors	75	90
	230	220
Debtors	193	158
Cash	37	62
	230	220

³Price change problems are avoided here. Assets and liabilities are expressed in money terms and it is assumed that there is no difference between the general price level assumed in the forecast and prevailing in the outcome.

Cash flows *ex post*

Despite the importance attached to cash flow forecasts in discussions of CFA systems, the analysis of *ex post* cash flows provides the main justification for CFA. In a sense the reason is that reported cash flow forecasts are not currently available, but it was seen earlier that explicit and reliable corporate forecasts lengthy enough for company valuation purposes are improbable. Thus, the argument for CFA on grounds of discounting forecast cash flows for valuation purposes disappears, and CFA must be considered on its *ex post* merits.

A central difficulty of employing CFA for *ex post* performance assessment is that CFA ignores non-cash movements in assets and liabilities, as was demonstrated in the simple debtors/creditors example in the previous section. CFA does not adequately register either the consumption or the build-up of non-cash assets, nor is there any recognition of holding gains or losses on assets held by the firm. This may lead to biased performance assessment in two directions: it can flatter the company which liquidates resources accumulated in past years or it can malign the growth company which invests in assets in excess of internally generated cash and finances the resulting cash deficit from borrowing.

When attention is directed to net operating flows, N , there is no estimate in CFA of the extent to which these flows were obtained by consumption of assets (depreciation of equipment or mineral deposits, running down stocks, etc). The Lawson system makes a deduction for estimated replacement investment, R , but this need bear no relationship to the consumption of resources in the period. A company might replace only a small part of its exhausted assets, and in any case those exhausted assets would match fixed asset consumption in a particular period only in unlikely circumstances.⁴ Thus separate disclosure of amounts for R and G (growth investment) would not mean that R matched the consumption of the period; consequently, G need not entail an overall increase in the company's resources—although users might be excused for assuming that was so. The Lee system does not separate R and G ; instead, the deduction of a single investment figure from N shows the extent to which investment is covered by internally generated funds. The result could quite easily be a surplus for a low-investment company which had not generated enough operating funds to cover the consumption of assets, but a deficit for a high-investment growth company whose operating cash flows covered asset consumption many times over. Such measures are

entirely valid in conveying *financing* information but false guides to *performance* assessment.

The issue of non-cash movements of assets is also important in the context of price changes. It is entirely valid to argue that CFA does not require price level adjustments because cash transactions reflect the prices of the period in which they occur (e.g. Lawson (1975), Lee (1981a)). But it does not follow that CFA offers a solution to the price/inflation accounting problem; CFA merely ignores that problem by excluding non-cash movements of assets. If the purpose of accounting reports is to report an enterprise's activities in the context of the prevailing economic environment, then recognition of price changes affecting non-cash assets held and consumed is essential. CFA patently cannot supply this; and suggestions that the problems of price change reporting can be solved by CFA are erroneous.

What CFA undoubtedly does provide is *ex post* financing information showing sources and uses of cash. Perhaps it is this aspect that Lee has in mind in stating (as mentioned earlier) that 'CFA emphasises... the ability of the enterprise to pay its obligations, make distributions, and provide for its future continuity (cash needed to reinvest, to expand [etc]...)' (Lee, 1981a, p. 72). This is uncontroversial if it means that *ex post* cash flows show that an enterprise was able to make certain payments in past periods.

The matter becomes debatable, however, if 'ability' is taken as meaning that past cash flows can reveal future ability regarding obligations, distributions and continuity. The predictive ability of past operating flows is unproven, although past corporate policy on financing can provide guidance on likely future conduct in the absence of contrary evidence; a company which has followed a policy of not running a cash deficit (to be met by borrowing or new equity) avoids certain financial risks, at the expense of foregoing possible financial rewards. But a company faces many other risks; in particular CFA does not reveal the important financial risk of dependence on trade credit, nor is it more informative than conventional accounting on the whole range of operating risks. Thus CFA may be said to emphasise some, but by no means all, aspects of 'downside risk'; on the other hand it gives sparse indication of the 'upside potential' of externally financed assets.

It is a truism that companies which become insolvent have run out of cash, and therefore it is hardly surprising that CFA can be used to demonstrate that companies which go into liquidation have cash flow deficits. But the reverse certainly does not apply; companies which run cash flow deficits do not necessarily go into liquidation—if they did, corporate financial markets would soon cease to exist.

Many of the points in this section can be illus-

⁴For example, a constant rate of fixed asset consumption, a balanced age structure for fixed assets, no technological change.

Table 3
Royal Dutch/Shell Cash Flow Results

	1975	1976	1977	1978	1979	1980	1981
	£m	£m	£m	£m	£m	£m	£m
Net operating receipts	3,770	4,422	4,777	4,787	5,067	5,601	7,423
Less: capital payments	1,295	1,907	2,223	2,174	3,999	2,953	4,069
	2,475	2,515	2,554	2,613	1,068	2,648	3,354
Less: interest payments	213	275	319	350	358	399	627
	2,262	2,240	2,235	2,263	710	2,249	2,727
Less: tax payments	2,411	2,043	2,150	1,689	1,383	2,468	2,961
	(149)	197	85	574	(673)	(219)	(234)
Less: dividend payments	340	466	546	564	629	681	689
TOTAL CASH SURPLUS							
(DEFICIT) MET BY BORROWING	(489)	(269)	(461)	10	(1,302)	(900)	(923)
SURPLUS (DEFICITS) IN							
1981 PRICES*	(1,070)	(505)	(747)	15	(1,719)	(1,007)	(923)

*Adjusted for General Index of Retail Prices.

trated with the aid of a CFA example. The format adopted follows that used in a *Financial Times* article on the financial weaknesses of BL and its cumulative government backed cash deficit (Lee, 1981c). On this occasion the method will be applied to a very different kind of enterprise, the Royal Dutch/Shell Group (RDS). RDS ran a series of huge cash deficits, financed by borrowing, during the period 1975–81. A cash flow summary for these years appears in Table 3; assumptions have had to be made in deriving the figures from published data,⁵ but the table gives a broadly valid approximation of cash flows.

The top line of Table 3 shows that RDS produced vast net operating receipts (excess of sales receipts over operating payments). But even a vast surplus at this stage does not necessarily prove that a company has been performing well in the use of its resources, because no charge has been made for the consumption of assets bought in earlier years. RDS could have been depleting oilfields acquired prior to 1975 and selling the oil at below historical cost. The cash flows cannot reassure the reader to the contrary.

Nor does an operating cash deficit in any year mean that the company must be losing resources; cash payments could be financing the build-up of stocks. Admittedly a *persistent* operating cash deficit is likely to be a warning signal, because it suggests either a net drain of resources or questionable stockpiling. However, the implications can only be gauged by resort to other sources of information—such as the balance sheet.

At the next stage the RDS capital payments have been covered handsomely by net receipts. That is informative from a financing viewpoint, but it does not give any indication of how effectively the group's assets were being used. For example, the net operating receipts would be very uninspiring if annual capital consumption proved to be several times the level of capital investment. That is a role in which current operating profit along Edwards and Bell (1961) lines would be of interest.

If the recent suggestion of Lee (1982) were adopted, that allocation problems of CFA might be reduced by ending the distinction between operating and capital payments, interpretation would become even more difficult. It would not be possible to assess which payments were intended to benefit future periods and which related to the current period.

The deductions for interest, tax and dividend payments produce a series of immense cash deficits (financed by borrowing) with only a small surplus in 1978. Naive readers of the CFA statements might well focus on the bottom line and draw unhappy conclusions. In fact, of course, RDS had an enormous asset base and profitable undertakings, which was why it could so readily borrow funds on the market. CFA in isolation provides no sign of this. Whether the investments eventually prove to have been worthwhile is something that obviously cannot be gauged from any current accounting reports, but their present status can be monitored.

CFA, position statements and NRVA

For cash flow the corresponding *stock* at the end of the accounting period must be the entity's cash holding. This is clearly inadequate as a representation of resources for a position statement, and this inadequacy is merely a reflection of the narrowness of CFA in ignoring non-cash flows.

⁵In particular, it has had to be assumed that payment was made for fixed assets in the year in which they were acquired, and that all interest was paid in the year for which it accrued. For the years 1975 and 1976, for which the amounts of dividends actually paid in those years was not available, it was assumed that dividends paid equalled the declared dividend of the time period.

Lee (1981b) has proposed a solution to the position statement problem which rescues CFA from some of its limitations. He suggests a system which combines CFA with net realisable value accounting (NRVA). Such a system would contain four statements, the first of which would be a cash flow statement of the sort discussed above, although with some re-ordering of the component items. In addition, there would be a balance sheet and income statement on an NRVA basis, entitled 'statement of net cash and cash equivalent resources' and 'statement of retained income' respectively. Finally, a statement of NRVA changes in financial position would be given the inappropriate title of 'statement of total cash flow movements'.

Thus the importance of profit measurement and of the closure values provided by the position statement would be explicitly recognised. This is to be welcomed to the extent that the profit/income measure is capable of being used for performance measurement, while the cash flow information reports on past liquidity movements. Perhaps rather more is intended by the inclusion in these statements of measures bearing the equivocal titles 'distributable cash flow' and 'distributable income'; if these *ex post* measures are intended to constrain the dividend decision they are no more promising than conventional approaches to distributable profit (see Egginton, 1980).

In any contemplated use of income in Lee's proposed system, the special nature of this measure must be recognised. He states (Lee, 1981b, p. 164) that neither the CFA nor NRVA bases assume the continuity of the activities of the enterprise and its management. Thus the exit values he appears to have in mind are what Edwards and Bell (1961, p. 79) called opportunity costs—'values that could currently be realized if assets... were sold... at the best prices *immediately* obtainable' (italics added). Such a valuation basis would be consistent with, and necessary for, the cash orientation of Lee's system. It would produce a balance sheet of approximate liquidation values, which could clearly be informative for any users interested in a firm's asset break-up cover (although issues like tax liabilities and redundancy payments are unresolved). There would be corresponding implications for the resulting income figure, which would be equivalent to Edwards and Bell's realisable profit.⁶ Such an income figure would estimate, for example, whether a firm teetering on the edge of liquidation had been justified in struggling on for a further year. That is, of course, a very different sort of performance measure from

mainstream profit measures which adopt a going concern presumption.

Despite the use of parallel terminology like 'cash equivalent' it would seem that the valuation basis envisaged by Lee is not the same as that adopted by Chambers for CoCoA. For Lee neither CFA nor NRVA assumes continuity, whereas Chambers is at pains to emphasise the going concern intentions of CoCoA, as in the following:

It was said [in Chambers 1966, p. 218] that 'the current cash equivalents of the assets of a going concern are the sums obtainable in the short run in the ordinary course of business; that is market resale prices in the short run'... I was... trying to avoid the charge (made by some) that accounting on the basis described was 'liquidation' accounting. That is why the passage refers to 'the ordinary course of business'. The whole of the accounting was intended to be accounting for going concerns. (Chambers 1974, p. 130)

Whether the CoCoA basis is effective in accounting for going concerns is not at issue here, but its adoption of resale prices *in the ordinary course of business* would appear to have a different time focus (and result in higher valuations) than a basis which refrains from any assumption that business will be conducted in the succeeding period. Lee's valuation basis is consistent with the immediate cash emphasis of CFA and such an approach could perform a very useful role in informing users about the firm under a 'liquidation scenario'. It would not, however, provide a measure of performance for a firm as a going concern.

Whatever the features of CFA and NRVA, it is over-optimistic to regard them as 'both allocation-free systems' (Lee, 1981b, p. 164). It was argued earlier for CFA that assignments of data to time periods constitute time-period allocations, and that classificatory allocations can only be avoided by eliminating most of the information content of accounts. As for NRVA, its claim to avoid allocation rests on the fact that a pure market price (whether exit or entry) produces a value at a point in time, which does not require any prior judgments involving time-period allocations. Thus market prices in position statements avoid the need for time-period allocations. However, as soon as a flow statement is added there is an assignment of value changes to a time period. That involves an allocation ('partitioning of a whole into parts') of the entity's continuing activities into time periods, which has more than semantic significance. The amounts allocated depend on the choice which is made between market price bases (e.g. 'ordinary course of business' or 'non-continuity'), and upon considerable judgment in the selection of relevant price data. Thus it does not seem particularly fruitful to attempt to avoid all allocations. What is

⁶Lee's Figure 5 uses the term *realised* income; it is assumed that *realisable* income is intended, since many elements of the income will not have been realised in any usual sense of that word.

important is to consider the extent to which particular bases provide information to assist the economic decisions of users, which in turn gives preference to reports reflecting the market and to reports which have safeguards against manipulative judgments.

In conclusion, Lee's combined CFA/NRVA system would have a cash orientation which would have considerable potential for liquidity assessment. However, it would not provide a measure of performance on a going concern basis for the continuing entity, of the sort which would be provided by a profit measure reflecting accruals and value in use.

Value added as a measure of corporate performance

Whatever the problems of CFA, there are only relatively minor difficulties in defining a cash flow. By contrast, VA presents a minefield of definitional problems; it could be measured on the basis of either cash flows or accruals and it could include or exclude a number of important items like depreciation or interest. However, the motives advanced by *The Corporate Report* (1975) for its original proposals for corporate VA statements are both plain and laudable. Such statements would disclose:

...how the benefits of the efforts of the enterprise are shared between employees, providers of capital, the state and reinvestment... [and]... assist users to evaluate the economic performance of the entity. (p. 48)

The intention is to provide a broader perspective to performance than is given by profit alone. Morley (1978) puts the comparison clearly:

Profit measures the wealth creation which has accrued for the *shareholders* during a period. On the other hand Value Added measures the wealth creation which has been built up by the co-operative efforts of *shareholders, lenders, workers and the Government*.

Accordingly, VA represents sales minus inputs from sources outside the assumed co-operative group. But this leaves considerable scope for interpretation. One possible interpretation would be consistent with a CFA system, as can be shown by returning to the algebraic representation of CFA considered earlier. Net cash flows from operations, N , can be split into the component elements:

S = receipts from sales

W = wage payments

P = purchase payments for goods and services employed in operations

so that

$$S - W - P = N$$

Substituting for N in equation (3) produces:

$$S - W - P - [R + G] - I - T - D = F \quad (4)$$

F shows the extent to which the firm's transactions were financed internally (positive F) or externally (negative F); it is the same as the total cash surplus/deficit used in the example in Table 3.

The elements in formulation (4) can be rearranged as follows:

$$S - P - [R + G] = W + I + D + T + F \quad (5)$$

This gives a cash flow representation of VA. The expression on the left hand side shows the source of the value added flow and the right hand expression shows its application. A formulation of this sort might be expected to be a feature of any CFA system which seeks to emphasise the overall entity view (as opposed to ownership) since it gives explicit recognition to employee rewards as well as payments to other participants. Instead the usual presentations of CFA emphasise residuals which are consistent with a proprietary view of the firm. Distributions to shareholders feature prominently but explicit recognition of employee rewards is notably absent (see equations (1), (2) and (3)), which hardly suggests an overall entity view.

Advocacy of a cash basis for published VA statements has been rare. Worth (1978) provides an exception which is not, however, linked to CFA arguments.

An accruals basis for VA would, at its simplest, merely transform the elements in (5) to a time-period allocation based on legal and contractual relationships rather than on the receipts and payments of cash. This would produce a VA measure (on the left hand side of formulation (5)) which has considerable similarities to the basis adopted for Value Added Tax in the UK and elsewhere in the European Community.

However, the most commonly discussed and published VA statements are those which do not deduct investment expenditures in calculating VA. Instead they are linked to conventional profit calculations in giving recognition to depreciation, either as a deduction in the calculation of VA or as an application. Developing this from the cash flow approach in formulation (5) requires the substitution of two separate elements r_a and g_a for the combined outlays R and G , with r_a representing depreciation and g_a the change in assets (apart from cash) less creditors. Netting off F and g_a to give undistributed profit ($U = F - g_a$) and putting all the other items onto an accruals basis (signified by the subscripts a) produces two alternative views of VA:

$$S_a - P_a = W_a + r_a + I_a + T_a + D_a + U \quad (6)$$

and

$$S_a - P_a - r_a = W_a + I_a + T_a + D_a + U \quad (7)$$

Of these two alternatives, the first method is by far the most popular in UK company reports.⁷ Morley (1978) calls the method 'positively dangerous' (pp. 59–60) and argues for the second method on grounds which include the undeniable argument that diminution in value of fixed assets is one of the costs of producing new wealth.

Both formulations (6) and (7) are intrinsically linked to profit measurement, since the elements $D_a \pm U$ will sum to a value for profit. Whether this summation is explicitly shown in the VA statement is a matter of presentation, but the motivation behind the VA statement would suggest playing down the nature of the combined element. Thus, Morley (1978) suggests that '... by the end of the century... the profit statement may have been relegated to a note in the corporate report!' (p. 269)

The VA statement in corporate reports has been the subject of particularly careful analysis by Morley (1978, 1981) and Rutherford (1977, 1980). Both have pointed to significant definitional problems and disadvantages of VA, but Morley sees the balance of advantages as being clearly in favour of the use of VA. His reasons for his conclusions are based on a number of advantages which seem characteristic of the arguments in favour of VA. They can be divided into two main groups, one concerning aspects of economic performance which will be considered here and the other relating to worker involvement which will be examined in the next section.

Morley (1978) suggests that VA would report the company's contribution to national income. Such a hope must be considerably blighted by Rutherford's (1977) analysis. This points among other things to the dangers of double-counting (e.g. if interest were treated as a component of VA by industrial companies and also as a provision of services by financial institutions), the difficulties that tax payments are not merely disbursements but finance the provision of services which can benefit the company (e.g. transport facilities, law and order) and the need for consistent recognition of VA on production or sale which is not present in conventional accounts. (The fact that VA statements can use conventional data is sometimes advanced as an advantage). Moreover, the notion of contribution to the national income of a particular national economy poses problems in respect of companies with international operations.

Quite apart from the measurement difficulties, it is questionable whether a measure of an individual company's contribution to national income on lines consistent with macroeconomic measures for

value added would be at all fruitful. At national level such measures ignore asset and liability valuation changes, which are often redistributive (e.g. arising from debt fixed in money terms when prices are changing) but may involve changes in national wealth (e.g. the discovery that a block of the North Sea contains oil). The former type of change cannot be said to involve wealth *creation*, but both types of valuation change are certainly relevant to wealth *accretion* for the individual enterprise. It is wealth accretion that would ideally prove most informative on a firm's financial performance, from the viewpoint of both participators and non-participators. Conventional historical cost profit is not, of course, much help here; an all-inclusive measure of profit which reflects valuation changes affecting both assets and liabilities is the best practicable indicator.

Morley also suggests that VA statements would have the advantage of directing attention to both employee and government shares in value added and to trends in their shares over time. Certainly such trends can be of interest at national level, but whether their use at company level deserves the publication of a VA figure is doubtful. Apart from the measurement problems mentioned above, it would seem better to report statements of sales and individual cost/recipient categories which will allow users to make whatever calculations they desire. There is some evidence (Hussey, 1981) to suggest that, at least for unsophisticated users, the VA approach can cause users to become confused over the significance of bought-in goods and services.

An emphasis on trends in VA in isolation from bought-in goods and services could in fact be quite misleading. For example, assume a company with £100 in sales in successive years. Bought-in goods and services in year 1 were £60, leaving VA of £40 divided equally between wages £20 and owners £20. In year 2, bought-in items were only £50, with wages £28 and owners £22. Wages had increased as a percentage of VA from 50% to 56% but (in the absence of increased investment and price rises) the owners are also better off. Thus percentage shares of VA are misleading; the owners would be better advised to concentrate on rewards in relation to their investment in resources, and it will be seen later that similar arguments apply to employee rewards.

Some other pitfalls in using VA, including the well-known danger of maximising VA rather than profit, are covered by Morley (1978, pp. 26–37) and Rutherford (1981).

VA and the workers

The emphasis of VA on the co-operative nature of a firm's activities is clearly directed primarily at

⁷For example, the 1981–82 *Survey of Published Accounts* (1981) showed that, of the 88 companies providing VA statements, 72 showed VA gross of depreciation, while 9 deducted depreciation. The remaining 7 companies either did not specify the basis or adopted a mixture of methods!

the workforce. Morley (1978) aptly expresses the underlying ambiguity:

The first advantage is an improvement in the 'team spirit' within the company . . .

. . . The enthusiasm for Value Added is partly a reaction to the fact that 'profit' is a dirty word to many workers. Amongst the ranks of the Value Added enthusiasts one finds those who sincerely believe that a better educated work force deserves the dignity of explicit recognition as responsible participators in the process of Adding Value. One also finds those who cynically use Value Added in order to de-emphasize the emotive word 'profit', although no change in the attitude or behaviour of management towards the work force is intended. (p. 19)

People's behaviour is not always determined by logic, and it is therefore conceivable that the mere presentation of a symbolic VA statement will enhance the team-spirit of a company's workforce. However, there would seem to be no logical reason to expect such a change on grounds of the VA statement *alone*, and Morley acknowledges the team spirit improvement as 'a hope rather than a promise' (p. 19). In the absence of behavioural evidence it is impossible to resolve this point.

A more material possibility is Morley's suggestion that ' . . . the introduction of productivity schemes based on Value Added is thereby facilitated' (p. 20). However, it would seem that the introduction of such schemes need have only the most tenuous connection with the publication of a corporate VA statement, particularly where different calculation bases apply in different segments of the firm. Many salesmen operated productivity schemes based on sales figures without undue problems long before companies published turnover figures in corporate reports.

There are, of course, other concrete ways of involving workers in the overall financial performance of the firm. One of these is to institute a profit-sharing scheme based on the issue of shares to employees. This approach is not without its problems (e.g. it costs more than a VA statement) but recent tax changes have stimulated a modest number of new schemes of this type (Breakwell, 1980).

In those cases where outside shareholders are eliminated and the firm becomes labour-controlled, it might be thought that VA really comes into its own—because all value after meeting outside commitments belongs to the worker/owners. Yet it is instructive that the renowned Basque Mondragon worker co-operatives maintain a clear distinction between pay and surplus (=profit). Average pay is linked to earnings in local capitalist enterprises (although differentials are very much narrower) and surplus is divided between the individual accounts of par-

ticipants and collective reserves (Thomas and Logan, 1982). Thus the role of profit is clearly important in the successful Mondragon system, although under the different name (in translation) of surplus. Perhaps a successful change of name needs some help from a change in the underlying system.

One further point of Morley's needs to be considered, and it has some relevance to Mondragon. It is the suggestion that:

. . . union negotiators could compare the proportions of wages to Value Added for each company in the industry . . . and one could consult the Value Added Statements for *prima facie* evidence as to which union seemed to achieve the highest share of Value Added for its members. (Morley, 1978, pp. 12–13)

This implies that VA will help employees and trade unions to aim for an increasing share in VA; such an objective could prove in fact to be harmful to the employees' interests. For example, a company with sales of £100 has bought-in goods and services of £30 and its VA is distributed equally between wages £35 and owners £35. The following year, with sales still at £100, the negotiators have managed to raise the wages share of VA to 60%. But the problem is that bought-in goods have risen to £50, with wages £30 and owners £20. The wages proportion of VA has gone up, but fewer workers are employed because bought-in goods have been substituted. The beneficiaries are the suppliers, who may not be operating in the same national economy. Thus, as in the Mondragon case, attention to competitive forces is more important than assuming that VA is some fixed amount to be divided between participants.

VA in search of a position statement

The prospect of finding a position statement for a company which articulates with VA is negligible. The conventional balance sheet records the fundamental position in relation to three groups: shareholders and lenders who are participants and creditors for goods and services who are considered as 'outsiders'. The balance sheet would also record any amounts remaining unpaid to employees or the government. Yet as a measure of value of the interest of these two groups, their balance sheet amounts would be negligible. Whereas the amounts of obligations to shareholders and lenders represent (approximate) capital amounts, the employees and government have no such recognition of their 'stock' position relative to the company. Should the prospective flow of future wages and taxes be discounted to present values?

The possibilities become complicated and un-

fruitful. In the absence of a workable position statement, VA becomes a *flow* without a corresponding *stock*. It shows movements between two points which remain permanently undefined. That hardly seems a strong candidate to displace profit.

Conclusions

CFA and VA are both measures that have been drafted in from other valid uses to bear an unreasonably heavy burden in the assessment of corporate performance. Cash flows have an undoubted importance for liquidity assessment and VA has important economic applications, but neither is capable of summarising the accretion in corporate resources which is encompassed in an all-inclusive profit measure based on entry or exit values. Nor do they reflect the consumption of resources in operations, as does current operating profit. They do not even compare well in all respects with historical cost profit. Cash flow does have the relative advantage of reflecting prices of the period in which payment and receipts occur but it also has disadvantages like ignoring movements in non-cash elements. VA (in the form envisaged in *The Corporate Report*) could be calculated on a basis consistent with any profit measure, and in that respect would therefore share the advantages or disadvantages of that measure.

In both cases the lack of a satisfactory position statement highlights the inherent weaknesses of the flow statements. Nor do CFA and VA fare well on the issue of avoiding the ownership emphasis of the profit statement; the usual presentations of CFA retain an ownership viewpoint, and there is no evidence that benefits arise from publishing VA statements which do not reflect the realities of control.

The proposal by Lee (1981b) aims at rescuing CFA by reinstating a profit measure of sorts and a corresponding position statement. Thus it would seem that, at least at the theoretical level, advocacy of CFA shows signs of returning to the profit measurement fold. This may have significance for some professional accountants who have been tempted in the direction of CFA in the face of difficulties over 'inflation accounting.'

The VA statement shows some signs that it may have peaked, so far as disclosure in UK corporate reports is concerned. There was considerable growth in the years 1975-78 (Gray and Maunders, 1979; Rutherford, 1980), but the *Survey of Published Accounts* (1982) shows a relatively static situation for the three years to 1980-81. It will be interesting to see whether the new profit formats under the 1981 Companies Act which give the same raw data as VA (but without calculating VA itself) have any influence on the number of VA statements published.

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Introduction

Accountants and analysts in both North America and the UK have shown a growing interest over the past decade in the possibility of companies publishing sales or profit forecasts, and there have been several studies exploring the views of executives, analysts, accountants and auditors, as well as some discussion of the topic in the journals of the accountancy profession.¹ Moreover, during this period a growing body of empirical work has been published relating to profit predictions already available to the investing public.

As regards the latter, the earliest American studies were concerned primarily to establish the accuracy of profit forecasts of both financial analysts and company executives. Recent studies have been rather more ambitious, for instance comparing analysts' predictions against those produced by company managers or by various time series forecasting models, and examining the impact of published forecasts on share prices.² Other work seems to suggest that over time analysts predict changes in earnings without systematic bias, though they may tend to underestimate very sharp increases in earnings.

Research in Britain has been far more limited in its scope, being largely concerned with the accuracy of managerial profit forecasts included in prospectuses for new share issues (e.g. Dev and Webb, 1972; Ferris, 1975, 1976; and Ferris and Hayes, 1977), in merger documents (e.g. Dev, 1972; and Westwick, 1972), or in company annual reports (Dev, 1974; Platt, 1979; and Steele, 1982). Only one study appears to have related specifically to analysts' forecasts (Cooper and Taylor, 1983).

The main objectives of the preliminary study reported in this paper are, firstly, to examine the accuracy of profit forecasts published in the circulars of British stockbrokers; and, secondly, to try and identify several key variables which might be expected to have an impact on forecast accuracy.³

¹Much of the accepted wisdom is distilled in the Accountants International Study Group (1974) monograph.

²See Penman (1980) for a brief review of the findings of the major studies in this area.

³Financial assistance from the Institute of Chartered Accountants in England and Wales to help meet the costs both of establishing a supplementary data file and of computing is gratefully acknowledged.

The data

Three data files were used in the study. The first (file 1) was developed from discarded brokers' circulars obtained from four sources and produced 599 usable pre-tax profit forecasts over the period 1970–74.⁴ These related to 171 companies and covered 259 firm-years, the firms being fairly evenly distributed across manufacturing industry and the distribution sector. Two thirds of the companies concerned had annual sales figures in excess of £25m. Altogether, the predictions of 58 research organisations were included, representing about a quarter of the then population of stockbroking firms.

A particular problem that arose in connection with the first data file was the danger of double-counting forecasts. This could arise either because different brokers were making similar forecasts at much the same time; or because the same brokers published revised forecasts later in the prediction period. In fact, given the non-random nature of the data it is debatable whether adjustment should be made for these possible sources of bias. However, it was decided that the second problem could be substantially resolved by undertaking univariate analysis, allowing for forecast interval; and the first by developing a second file of data (file 2) substituting an average for individual broker forecasts when there was more than one at the same time (an expedient used by other researchers in this area, e.g. Barefield and Comiskey, 1975a; Basi, Carey and Twark, 1976; and Cooper and Taylor, 1983).

In preparing this second file it was soon apparent that brokers seem to reach a consensus when forecasting profits for a particular company at a given point in time, a phenomenon already observed in the United States (see, for example, Barefield and Comiskey, 1975a, 1975b; Basi, Carey and Twark, 1976; and Richards, 1976). In fact, on the 89 occasions identified where two or more brokers were making forecasts for the same company at the same time, almost half the predictions were within a $\pm 5\%$ range and some 94% within $\pm 10\%$. Of course, this may merely mean that analysts read each others' reports and follow a

⁴The one exception made was for oil companies, where it is customary to forecast profits after tax.

general lead; or instead that they independently reach the same conclusions as a result of using the same or similar techniques of analysis. However, in many instances the circulars bore common dates, which suggests that if the first explanation is the correct one there must be a good deal of verbal contact. In either case, though, the fact that a consensus is reached suggests that professional analysts adapt rapidly to any news signalled to the market, which would be consistent with the efficient markets hypothesis.

The substitution of a consensus average forecast for individual broker predictions reduced the observations in the first data base from 599 to 346. However, the overall forecast error characteristics of the two sets of data were remarkably similar, and a chi square test for independent samples at the 99% confidence level could not reject a null hypothesis that they came from the same population. Consequently, for the purposes of this study the univariate results reported relate to the full data file of 599 observations, except where those for the second file were substantially different.

Apart from the problem that the companies whose profits were being forecast were selected non-randomly, the first two data files also suffered from the fact that the predictions were pooled across time. To allow for these two factors a third data file (file 3) was obtained which comprised the profit forecasts of a single broking firm in August 1975, relating to 102 leading companies⁵ which together represented a cross section of the market and whose combined capitalised equity market value was over 75% of the total outstanding on the Stock Exchange.

Another difficulty which affected the analysis of all three data bases related to the problem of finding 'actual' pre-tax profit figures defined in identical terms to those forecast (see Dev, 1973). In fact, figures for actual pre-tax profits reported by companies were obtained from three sources: firstly, where possible from the circulars themselves; secondly, from Moodiecards and Extel cards; and thirdly, from the *Investors Chronicle*. Care was taken to try and ensure in all cases that the definitions of pre-tax profits were substantially the same as those used by brokers, though in a few instances small discrepancies were noted. However, these did not appear to be of sufficient size to invalidate the general tenor of the results.

Measuring forecasting accuracy

Absolute measures of forecast accuracy are by themselves of limited interest, and it is generally more helpful to establish a benchmark against which performance can be measured. This can be

achieved by generating alternative profit forecasts, employing either time series or causal prediction models.

As regards the former, a time series of earnings can either be serially correlated or it can represent a martingale process. Empirical research, both in the UK and USA, originally suggested that earnings follow a sub-martingale pattern, though for some companies there might be weak serial correlation over shorter sub-periods of time (e.g. Brooks and Buckmaster, 1980). Moreover, experiments have seemed to show that for particular samples of companies various mechanical models can produce forecasts as good as, if not better than, those published by analysts (e.g. Nichols and Groomer, 1979; Schlatter, Haugen and Wichern, 1980), though there is some evidence that the time series earnings patterns of firms voluntarily disclosing profit forecasts are unusually smooth (Ruland, 1979).

The three naïve models employed in this study have frequently been used elsewhere as benchmarks against which to assess forecasting ability (e.g. Richards, Benjamin and Strawser, 1977), the first two covering the situation where the time series follows a simple trend pattern, the third being more appropriate if it is martingale. They were:

- (1) Annual profits grow compoundly at the percentage rate of profit increase most recently experienced (naïve model 1).
- (2) Annual profits grow by the absolute profit increase most recently experienced (naïve model 2).
- (3) Annual profits are the same as those most recently experienced (naïve model 3).

The alternative is to develop a causal forecasting model, where the profits of companies are functionally related to several variables, such as lagged consumer spending and macro-economic activity (see Albrecht, Johnson, *et al*, 1977). However, it was decided that for the purpose of the present, preliminary stage study it would be sufficient to follow the general approach previously adopted by Richards (1976) and Ferris and Hayes (1977) and try to develop a series of simple causal models on the basis of the univariate results to see which sets of variables best seemed to explain forecast accuracy.

Various ways of measuring forecasting accuracy have been suggested in the literature (see Brandon and Jarrett, 1976), but a primary consideration is whether to assess it in terms of the ordinary or relative error—normally the latter will be preferred when it is necessary to scale for size. A further problem is that over- and under-estimates will tend to cancel each other out unless the error signs are ignored; this can be overcome by calculating absolute deviations. A further refinement allowing for the quality of forecasts is offered by the squared

⁵60 of the 171 companies in the first and second data files appeared in the third.

error measure, which gives greater weight to large forecast errors, and this has frequently been used in the economics literature as a measure of predictive accuracy.⁶ But however the forecast errors are defined, their distributions can be described in terms of their means, standard deviations and degrees of skewness, and such summary statistics can be informative, particularly when compared against their naïve prediction model counterparts.

Other measures of forecast accuracy suggested in the literature are Theil's U test and the entropy measure. However, the latter is difficult to interpret meaningfully, while the former should technically only be used on *changes* in earnings and on time series rather than cross sectional data (Brown and Rozeff, 1978). Consequently, the three statistical measures used as the main indicators in this study were the relative error, the absolute relative error and the squared error (the latter in both its absolute and relative forms).

Predictions made by analysts are usually point estimates of future earnings, whereas the actual outcomes can be regarded as random variables from the probability distribution of predicted profits. Consequently the measure of relative forecast error adopted was $(F_i - A_i) \div F_i$, where F is forecast and A is outcome for i observations.⁷

Univariate analysis

Frequency distributions of the relative and absolute relative errors were calculated for the various data files and for each of the three mechanical prediction models. The mean, standard deviation and third moment skewness measures were then computed for each frequency distribution,⁸ as well as the mean squared relative error and the squared error statistics. The results are shown in Table 1. Similar procedures were then applied to disaggregated data in order to enable each of a series of propositions ($P_1 \dots P_8$) to be tested in terms of an associated null hypothesis (H_0).

(a) Overall Accuracy

Most previous cross sectional studies concerning the accuracy of profit forecasts seem to have produced results which could be interpreted as offering evidence of bias on the part of analysts or executives, with those undertaken in the USA

generally suggesting that such predictions are over-optimistic, whereas UK research instead implies that profit forecasts are on average too low. Such results could of course be evidence of a general inability to forecast accurately a systematic factor affecting the profitability of all companies, such as the underlying rate of inflation in a particular period. Alternatively they might reflect behavioural attitudes (Ferris, 1975) or the nature of the forecasting procedure itself. As regards the latter, it has been suggested that the statistical distributions of the cost and revenue functions for many businesses are likely to be skew rather than symmetrical, since below a certain level costs become unavoidable; while, equally, above a certain point increases in revenues are less likely than decreases (Otley and Berry, 1979). Consequently, if analysts' profit forecasts are prepared by disaggregating data and trying to estimate both cost and revenue functions—as they may well be, particularly for large, diversified companies—the distribution of expected outcomes will no longer be normal but skew. Moreover, it may well be the modal value which is forecast rather than the mean expected outcome.

By contrast, where forecasters attempt to predict profits direct, they might reasonably be expected over a lengthy period of time to be able to identify the parameters of the distribution, such as the mean. If the probability distribution of profit forecasts for a particular company is then stable over time, on average the estimates should be close to the mean, suggesting there is no systematic bias in the predictive process. Evidence to support this view has been provided by the work of Crichfield, Dyckman and Lakonishok (1978), which is consistent with the findings in research studies concerning the rational expectations hypothesis in macro-economics, relating to other forecast variables.

On balance, it seems likely that the distribution of forecast errors for a cross sectional study will be skew, and this is the first proposition (P_1) to be tested, the null hypothesis (H_0) being as follows:

$P_1: H_0$ —Brokers make unbiased profit forecasts, hence the prediction errors should be symmetrically distributed and the mean relative error should approximate to zero.

In order to test this proposition, the distributions of both relative and absolute relative errors of brokers' profit forecasts were subjected to appropriate tests for normality. The results showed that for all three files the null hypothesis could be rejected at the 99.9 per cent confidence level. As the summary statistics in Table 1 clearly show, both the relative and absolute relative error distributions are strongly skewed, and the mean relative error does not approximate to zero.

A closer examination of the figures shows that for the first two data files about a third of the

⁶For a discussion of the quadratic loss function, which proved important in this study as a means of identifying relative forecasting accuracy, see Brandon and Jarrett (1976) pp. 70–74.

⁷In fact, this is the definition used in most previous studies (e.g. McDonald, 1973; Ferris, 1976; Ruland, 1979). However, Dev and Webb (1972), Daily (1971) and Westwick (1972) employed $A_i \div F_i$, and others have used $(F_i - A_i) \div A_i$ (e.g. Copeland and Marioni, 1972; Basi, Carey and Twark, 1976; Richards, 1976; Brown and Rozeff, 1978).

⁸The measure of skewness used was the scaled third moment about the mean (Hoel, 1962).

Table 1
Accuracy of brokers' forecasts and naïve prediction models

% Error (F - A)/F	599 observations (File 1)						346 observations (File 2)						102 observations (File 3)					
	Brokers			Naïve			Brokers			Naïve			Brokers			Naïve		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
> +30	2.8	16.9	7.2	2.7	7.2	2.7	4.0	18.2	10.7	3.8	2.0	13.7	17.6	10.8	2.0	13.7	17.6	10.8
+20 to +30	2.5	11.2	9.5	4.8	9.5	4.8	2.3	11.3	8.1	4.0	2.0	3.9	2.9	3.9	2.0	3.9	2.9	3.9
+15 to +20	3.2	8.7	10.7	3.8	10.7	3.8	4.0	7.5	7.2	2.9	1.0	6.9	2.9	4.9	1.0	6.9	2.9	4.9
+10 to +15	4.8	7.2	4.7	0.5	4.7	0.5	4.9	4.9	5.5	0.9	2.0	4.9	4.9	6.9	2.0	4.9	4.9	6.9
+5 to +10	7.0	5.7	6.5	2.0	6.5	2.0	7.5	7.2	7.2	3.2	4.9	2.0	4.9	1.0	4.9	2.0	4.9	1.0
0 to +5	15.0	1.7	5.7	4.5	5.7	4.5	14.2	2.6	6.6	3.5	18.6	4.9	3.9	3.9	18.6	4.9	3.9	3.9
0 to -5	15.4	5.0	6.2	3.0	6.2	3.0	16.8	6.6	5.2	2.9	14.7	6.9	8.8	8.8	14.7	6.9	8.8	8.8
-5 to -10	12.9	6.8	6.0	6.0	6.0	6.0	11.3	5.8	6.9	7.5	17.6	2.9	2.9	6.9	17.6	2.9	2.9	6.9
-10 to -15	7.7	3.7	5.7	8.8	5.7	8.8	7.2	4.6	6.9	6.6	10.8	10.8	7.8	9.8	10.8	10.8	7.8	9.8
-15 to -20	9.7	3.2	5.7	6.3	5.7	6.3	7.8	2.9	5.5	6.1	12.7	3.9	5.9	7.8	12.7	3.9	5.9	7.8
-20 to -30	9.5	11.0	9.5	9.3	9.5	9.3	10.7	8.4	6.9	9.8	5.9	5.9	4.9	8.8	5.9	5.9	4.9	8.8
< -30	9.5	19.0	22.7	48.1	22.7	48.1	9.2	19.9	23.1	48.8	7.8	33.3	32.4	26.5	7.8	33.3	32.4	26.5
<i>Relative error:</i>																		
Mean	-7.69	16.25	-14.08	-79.56	-14.08	-79.56	-5.86	-15.64	-5.90	-114.73	-8.47	-43.38	-2.25	-15.62	-8.47	-43.38	-2.25	-15.62
Standard deviation	25.84	103.96	214.18	782.70	214.18	782.70	26.15	119.65	271.78	1,027.71	16.15	188.49	155.56	49.91	16.15	188.49	155.56	49.91
Third moment measure	-1.40	-7.51	10.95	-17.11	10.95	-17.11	-0.27	-7.7	9.31	-12.99	-0.90	-7.06	4.21	-3.06	-0.90	-7.06	4.21	-3.06
<i>Absolute relative error:</i>																		
Mean	16.26	44.35	54.24	87.40	54.24	87.40	16.53	47.42	64.26	123.66	12.69	64.89	66.18	31.37	12.69	64.89	66.18	31.37
Standard deviation	21.51	95.43	207.67	781.86	207.67	781.86	21.10	110.97	264.13	1,026.68	13.09	182.21	140.79	41.84	13.09	182.21	140.79	41.84
Third moment measure	3.75	8.97	13.32	17.14	13.32	17.14	3.26	8.94	10.99	13.00	2.01	7.49	5.07	4.56	2.01	7.49	5.07	4.56
<i>Mean squared relative error</i>																		
Squared error	0.0727	1.11	4.61	61.90	4.61	61.90	0.0718	1.46	7.39	106.9	0.0332	3.74	2.42	0.273	0.0332	3.74	2.42	0.273
Mean ($\times 10^{11}$)	0.0596	0.142	0.146	0.113	0.146	0.113	0.0418	0.0995	0.103	0.0806	0.00153	0.113	0.0673	0.0173	0.00153	0.113	0.0673	0.0173
<i>Differences, due to:</i>																		
Standard deviation ($\times 10^{10}$)	0.392	0.590	0.608	0.537	0.608	0.537	0.267	0.458	0.481	0.450	0.00705	0.815	0.441	0.0545	0.00705	0.815	0.441	0.0545
Covariance (direction) ($\times 10^{10}$)	0.179	0.794	0.811	0.543	0.811	0.543	0.140	0.519	0.528	0.327	0.00678	0.284	0.220	0.116	0.00678	0.284	0.220	0.116
Systematic error (bias) ($\times 10^9$)	0.250	0.342	0.435	0.480	0.435	0.480	0.111	0.174	0.236	0.293	0.0149	0.287	0.126	0.0228	0.0149	0.287	0.126	0.0228

brokers' relative forecast errors were less than $\pm 5\%$; and almost exactly a half were less than $\pm 10\%$. Performance was slightly better in terms of mean relative error for these two files than for the third file, though overall in the latter brokers again managed to keep one third of their forecast errors within $\pm 5\%$; and some 56% of their predictions within $\pm 10\%$ of outcomes, a superiority reflected in the better mean absolute relative error statistic. In fact, for this third file no less than 62% of errors were within the -15% to $+5\%$ interval, compared to around 50% for the first two data files, and it is evident that even outside this range there was closer bunching of the forecast errors, though equally a greater tendency to underestimate actual profits reported. This bias may be a characteristic peculiar to the broker concerned, though in the light of previous evidence about the tendency to produce consensus forecasts it seems more likely to be the result of a different economic environment within the time period of the data; or of different characteristics of the forecasts included (e.g. forecast interval; or they related to firms of different size and risk class or in different industries).

Given professional analysts' access to a wide information set, one might reasonably expect their profit forecasts would be more accurate than those produced by fairly simplistic mechanical prediction models. This was therefore framed as the second proposition to be tested, the null hypothesis being:

$P_2:H_0$ —Brokers' profit forecasts are no more accurate than predictions produced by each of the three naïve models, implying that the distributions of relative forecast errors should not be significantly different.

This was tested by comparing the distributions of the brokers' forecast errors against the corresponding distributions for each of the three naïve prediction models for all three files. In every case the null hypothesis could be rejected at the 99.9% confidence level. The inferior performance of the mechanical forecasting models is also evident in the summary statistics of the error distributions where the mean, standard deviation and third moment measures for both the relative and absolute relative errors are very much larger than for the brokers' forecasts. However it is interesting to note that, while the relative error distributions of naïve models 1 and 3 were also negatively skewed (indicating a pessimistic bias in the forecasts), naïve model 2 produced a positively skewed distribution. This would be consistent with a period in which profits were increasing, but at a slower rate than previously, i.e. a slowing down in the rate of inflation and/or the approach of the end of a boom. The comparatively good performance of this particular model in terms of the mean relative error for files 2 and 3 results from the fact that

large positive forecast errors cancelled out similarly large negative ones. This suggests that the mean absolute relative error would be a more informative statistic, and indeed in all cases it indicates that brokers' forecasts were more accurate than those produced by the model.

It is also noticeable that with the first two data files the 'no change' naïve model 3 was the least accurate at forecasting in terms of the mean error and mean squared error statistics; moreover, it produced the most strongly negatively skewed distributions. This would seem in part to reflect the impact of inflation, especially since the period covered by the observations was not notable for rapid economic growth, nor for a general increase in company profits in real terms. However, with the third data file it performed best of the three mechanical forecasting models, presumably because of a more predictable economic environment, with a lower growth rate of profits in money terms.

The relative accuracy of brokers' profit forecasts can also be assessed by preparing a ranking table to see which prediction of the four (brokers' and the three naïve models) was closest to the actual outcome. The third proposition to be tested therefore produced the following null hypothesis:

$P_3:H_0$ —In terms of rankings, brokers' profit forecasts are no closer to actual outcomes than are the predictions of each of the naïve models individually, or to the nearest prediction of those models together—i.e. they rank first only 50% of the time.

Again applying the chi square test for independent samples, the superiority of the brokers' predictions was clearly confirmed in all cases for each of the data files at the 99.9% confidence level—not only did they easily beat the models individually, but they also outperformed their combined efforts, ranking first in two thirds of the cases.

Another means of trying to assess the overall accuracy of brokers' forecasts is to examine the number of occasions where the directional movement of a company's profits was incorrectly predicted.⁹ In fact, for the first data base the analysts were only in error in this respect with 10% of their forecasts, mostly in relation to very small companies. However, in 12 of the 57 instances the forecast error was within a range of $\pm 15\%$. Moreover, on 20 occasions the forecast was made ten months or more before the relevant year end.

(b) *Accuracy in Relation to Forecast Interval*

Several previous studies on the accuracy of profit forecasts have found that predictions have

⁹For instance, Barefield and Comiskey (1975b) found that analysts correctly predicted two-thirds of actual turning points; while Cooper and Taylor (1983) report an 82.6% success rate.

Table 2
Accuracy of brokers' forecasts in relation to company size
(File 1)

% Error ($F - A$)/ F	Size (actual profits)			
	<£10m	£10m-£25m	£25m-£50m (Percentages)	>£50m
> +30	6.0	—	—	—
+20 to +30	3.4	2.3	2.7	0.8
+10 to +20	8.6	9.9	6.8	4.1
0 to +10	25.9	22.7	31.1	10.7
0 to -10	27.7	40.2	9.4	28.7
-10 to -20	12.7	15.1	28.4	23.8
-20 to -30	7.5	6.8	16.2	13.1
< -30	8.2	3.0	5.4	18.8

been significantly closer to actual outcomes the nearer they have been made to the year end (e.g. Dev and Webb, 1972; Westwick, 1972; Basi, Carey and Twark, 1976; Collins and Hopwood, 1980; and Cooper and Taylor, 1983). Consequently the following proposition was formulated as a null hypothesis:

$P_4:H_0$ —The distributions of relative forecast errors are the same, regardless of forecast interval.

For testing purposes the relative error data were disaggregated with forecast intervals being set at 3, 6, 9 and 12 months. Using the chi square test for independent samples on first file data the null hypothesis could be rejected at the 95% confidence level for all paired combinations of intervals except for forecasts made between 3-6 and 6-9 months of year ends, with the differences being most obvious in the squared error statistics for the different distributions. In fact, the results showed that of forecasts made within three months of year ends nearly four-fifths of relative forecast errors were within the range $\pm 10\%$, while forecasts made within 3-9 months of year-ends were considerably less successful, only some 55 per cent being within the $\pm 15\%$ range and a bare two-fifths within $\pm 10\%$. Rather surprisingly, however, the record for forecasts made 9-12 months before the year-ends was much better, two-thirds being within the

$\pm 15\%$ range and over three-fifths within $\pm 10\%$. However, this may of course have partly been the result of different sample characteristics in terms of firm size, industry classification, risk class, etc.¹⁰

The vast majority of forecasts in the third data file were made within six months of year ends. However, in this case it proved impossible to reject the null hypothesis at the 95% confidence level that there was no difference between the distributions of relative forecast errors for predictions made within 0-3 and 3-6 months of year ends. In fact, the main difference between the first and third data files was that the latter's relative forecast errors for predictions made within three months of year ends had a slightly wider dispersion, whereas the reverse was the case for relative forecast errors in the 3-6 month interval.

(c) Accuracy in Relation to Company Size

It has been suggested in the literature that analysts find it easier to forecast the profits of very large companies which tend to have developed a diversified portfolio of investments, though there is little evidence on this point from previous studies. To analyse the proposition the following was formulated as a null hypothesis:

$P_5:H_0$ —The distributions of relative forecast errors are the same, regardless of the size of companies concerned.

To enable this proposition to be examined the data in the first file were broken down into four categories, size being measured in terms of actual profits earned, as follows: <£10m, £10m-£25m, £25m-£50m, and >£50m.¹¹ The results are shown in Table 2.

¹⁰Sensitivity runs were conducted for longer intervals, the periods being chosen to try to ensure that any informational content contained in interim announcements (normally published within 1-3 months of the end of a company's half year) would be reflected in the figures. Using similar test procedures, the results gave a clearer and more definitive picture of the decreasing accuracy of profit predictions as the forecast interval was lengthened, being significant at the 99% level.

¹¹Turnover was used as an alternative measure of size, but the results were not substantially different.

Using the chi square test for independent samples on first file data, the null hypothesis could be rejected at the 98% confidence level for all paired combinations of sizes, with the differences again being most obvious in the squared error statistics for the different distributions.

The relative difficulty analysts appear to have on this evidence in forecasting for companies in the <£10m range compared to those in the £10m-£25m category may in part reflect the different degrees of risk to which they are subject. On the other hand, the fact that analysts also appear to have some difficulty in forecasting profits of the largest and generally more diversified companies as accurately as for those in the £10m-£25m group may at first sight seem surprising, as research in both North America and the UK appears to suggest that forecasting profits segment by segment should produce more accurate predictions than forecasting them for a diversified unit as a whole (e.g. Emmanuel and Pick, 1980). However, as has been mentioned previously, aggregating forecasts for units which are substantially statistically independent of each other can itself help accentuate prediction errors (Otley and Berry, 1979).

Very few of the companies in the third data file earned profits less than £10m, so comparisons could only be made between the relative forecast error distributions for three size categories: £10m-£25m, £25m-£50m, and >£50m. The results were rather different from those reported above, it proving impossible to reject the null hypothesis at the 95% confidence level for any combination of the size categories.

(d) *Accuracy in Relation to Industry Category*

Several previous studies have been unable to establish the importance of the industry factor in the predictive process (e.g. Cragg and Malkiel, 1968; Ferris, 1976), but more recent research by Richards (1976) and Richards, Benjamin and Strawser (1977) suggests it is indeed an important determinant of forecast accuracy. As a result, the following proposition was formulated as a null hypothesis:

$P_6:H_0$ —The distributions of relative forecast errors are the same, regardless of industry membership of the companies concerned.

For the purpose of testing this hypothesis the data in the three files were first disaggregated into their appropriate 21 Actuaries' industry classifications. A preliminary examination of the forecasting error distribution for the first data file suggested it might well be easier to forecast profits for firms operating in the food retailing, stores, food manufacturing, electronics and TV, and insurance industries, but far more difficult to predict accurately the fortunes of companies operating in

the heavier manufacturing sectors, such as chemicals, oil, metals, engineering, electricals and construction. However, these findings were not entirely borne out by the results of the analysis of the third file data. On this occasion relatively good forecasts were produced for firms in the electricals, construction, and paper and publishing industries; and while it was confirmed that it seems to be difficult to predict accurately earnings of firms operating in the chemicals, oil, metals, and engineering sectors, there was also evidence that it is not always easy to forecast profits for firms in the tobacco, wines, spirits and brewing, shipping and overseas trade and motor industries.

The small number of observations in a number of industry categories (particularly in the third file) necessitated aggregation of data before proposition P_6 could be tested. For this purpose two broad industry categories were established: on the one hand, mineral extraction, the manufacture of industrial goods, and construction; and on the other, the manufacture of consumer goods, and the services sector. On this basis, the null hypothesis that the two distributions came from the same sample could be rejected on first file data at the 99.9% confidence level, the differences in distributions being most obvious from the squared error statistics. Thus, whereas over two-thirds of the relative forecast errors were in the $\pm 10\%$ range for the 'services' sector, only 37.7% of those in 'heavy manufacturing' were within that range. However, analysis of the third file data presented a slightly different picture. In this case it was not possible to reject the null hypothesis, though 60% of relative forecast errors in the 'services' sector were within the $\pm 10\%$ range, compared to 52.6% for 'heavy manufacturing'. Overall it is difficult to draw any very strong conclusions from the analysis. Small sample sizes, the length of forecast interval, and other firm characteristics may have been the cause of any differences between the two files' results, as indeed might have been changes in the economic circumstances underlying the two sets of data. It may be that certain industries are always relatively easy to predict, some are far more difficult, and for others it varies depending on the precise set of economic circumstances prevailing. In general, further research would be needed examining the position over a lengthy period of time before a conclusion that earnings in an industry are relatively easy or difficult to forecast could be strongly supported.

(e) *Accuracy in Relation to Risk Category*

Work by Ahlers (1972) suggests that forecast error may in some circumstances be a reasonable measure of operating risk, and Barefield and Comiskey (1975a, 1975b, 1979) therefore examined the relationship between three risk indicators over a 6 year period for a population of 100 companies: mean absolute profit forecast error was more clo-

Table 3
Relationship between forecast accuracy and risk (as measured by beta coefficients)

	Second data file*				Third data file			
	No. of observations	% of observations in each beta interval			No. of observations	% of observations in each beta interval		
Accuracy interval (F - A) ÷ F		±15%	±10%	±5%		±15%	±10%	±5%
Beta interval								
<0.6	6	100.0	66.7	33.3	1	100.0	100.0	100.0
0.6 - 0.8	52	53.4	38.5	23.1	10	80.0	70.0	50.0
0.8 - 1.0	74	55.4	47.3	31.1	29	69.0	44.8	24.1
1.0 - 1.2	135	68.1	57.0	35.5	40	65.0	57.5	30.0
1.2 - 1.4	45	60.0	46.7	31.1	19	63.2	52.6	36.8
>1.4	3	100.0	100.0	66.7	3	100.0	100.0	66.7
	315				102			

*Reduced to 315 observations for which beta values were available.

sely associated with market beta than was earnings variability. However, they also pointed out that the strong association between all three measures suggested 'it is more difficult to forecast earnings of companies with greater historic earnings variability' (1975a, p. 321), and hence implicitly of those companies with high beta values.¹²

To examine the point the following proposition was formulated as a null hypothesis:

$P_7: H_0$ —The distributions of relative forecast errors are the same regardless of companies' beta values.

Beta statistics were then obtained for as many firms as possible in the second and third data files, the majority being taken from the London Business School's *Risk Management Service* (1979). In fact, betas were not available for 16 of the smaller companies included in the second data base: 15 had been taken over since the forecasts were made, and 1 had been liquidated. The overall effect was to reduce the number of observations in the second file from 346 to 315.

For the purpose of the analysis relative error statistics were grouped in terms of the following ranges of beta values: <0.6; 0.6-0.8; 0.8-1.0; 1.0-1.2; 1.2-1.4; >1.4. Using the chi square test for independent samples on modified second file data the null hypothesis could be rejected at the 90% confidence level for all paired combinations of beta categories, but only in three instances at the 95% level (0.6-0.8 vs 0.8-1.0 and vs 1.0-1.2; and 0.8-1.0 vs 1.0-1.2). Again the differences were most obvious in terms of the squared relative error statistics, and are also evident in the absolute

relative error distributions shown in Table 3. However, no clear relationship inversely relating forecast accuracy to increasing systematic risk could be identified. As for the third file data, it was not possible to reject the null hypothesis for comparisons of the three main beta groupings (0.8-1.0, 1.0-1.2, and 1.2-1.4).

Overall, the results do not offer strong support for Barefield and Comiskey's findings on US data, and this could be explained if it is unsystematic rather than systematic risk which more appropriately reflects difficulty in forecasting.¹³

(f) Accuracy in Relation to Individual Broker

The fact that analysts seem to reach a consensus would suggest there is probably very little to choose between the advice proffered by different brokers, and indeed Richards (1976) found differences in their forecasting abilities statistically insignificant.¹⁴ However, it is well-known that broking firms tend to specialise in their research, concentrating their attentions on different industries. Moreover, some analysts appear to play safe and only forecast up to five or six months ahead, while others regularly predict up to one year or even 18 months in advance. Consequently apparent variations in the relative accuracy of forecasts as between broking firms might well be expected, even though such differences are probably of little real significance.

¹³Considerable research has been undertaken in the US trying to identify the association between unsystematic security returns and earnings forecast errors, the projected profits being produced mechanically. See, for example, Beaver, Clarke and Wright (1979).

¹⁴However, Cooper and Taylor (1983, p. 16) suggest there is a 'very large spread amongst brokers' estimates.'

¹²Richards, Benjamin and Strawser (1977) also found a high correlation between forecast accuracy and earnings variability.

Table 4
Correlation coefficients from simple regression models

No. of observations	Second data file* 315	Third data file 102
<i>Model</i>		
<i>(a) Industry classification (I)</i>		
$(F - A)/F = a + bI$	0.04	0.03
$ (F - A)/F = a + bI$	0.02	0.02
$A = a + bI$	0.02	0.00
<i>(b) Forecast interval (T)</i>		
$(F - A)/F = a + bT$	0.00	0.00
$ (F - A)/F = a + bT$	0.03	0.00
$A = a + bT$	0.01	0.00
<i>(c) Risk (Beta values) (R)</i>		
$(F - A)/F = a + bR$	0.00	0.00
$ (F - A)/F = a + bR$	0.01	0.01
$A = a + bR$	0.03	0.04
<i>(d) Size (S)**</i>		
$(F - A)/F = a + bS$	0.15	0.00
$ (F - A)/F = a + bS$	0.13	0.00
$A = a + bS$	0.88	0.99

*Reduced to 315 observations for which beta values were available.

**Defined in terms of actual profits, hence the high correlation coefficients when A is the dependent variable.

In order to test this, the following null hypothesis was formulated:

$P_8: H_0$ —The distributions of relative forecast errors are the same regardless of the broker's identity.

An analysis for the 15 brokers in the first data file who had provided 14 or more forecasts, eleven of whom were amongst the 33 largest stockbroking firms, confirmed that there were significant differences at the 95% confidence level between the distributions of relative forecast errors for several of them. However, closer inspection almost always indicated reasons for the discrepancies. For instance, the three firms which did best seemed to have concentrated on forecasting performance for the 'easy' industries, such as the retail sector, and predicted for periods of less than a year ahead. By contrast, two of the largest and best-known brokers performed relatively badly, both because many of their forecasts related to the long-term and also because they concerned companies in the oil and chemical sectors. Another firm specialised in predicting profits for small and medium-sized textile manufacturers, and this could well have helped explain its below average performance.

Multivariate analysis

Although it is clear that forecast accuracy is determined by many factors, quite apart from the variables previously discussed, the results of the univariate study were regarded as being sufficiently encouraging to justify multivariate analysis. The only variable excluded at this stage was broker identity, partly because it could not be adequately accommodated within the multiple regression model, but also because (for reasons given previously) it seemed unlikely to have any substantial explanatory power.

Suitably normalised data from the second and third files were used in this part of the study, with a dummy for two industry classes: (1) mineral extraction, the manufacture of industrial goods, and construction; and (2) the manufacture of consumer goods, and the services sector.

Table 4 shows the correlation coefficients between relative forecast errors, $(F - A)/F$, and absolute relative errors, $|(F - A)/F|$, and each of the four independent variables taken separately. To test for significant relationships the actual profits were also regressed against each variable. However, apart from size (which was defined in terms

of actual profits, of course), there was only significant correlation in one instance—risk—and even there the relationship was extremely weak, which again does not accord with the results of Barefield and Comiskey (1975a, 1975b, 1979).

The full linear model to be estimated was

$$\frac{F-A}{F} \text{ or } \left| \frac{F-A}{F} \right| = \alpha_0 + \alpha_1 T + \alpha_2 S + \alpha_3 R + \alpha_4 I + e \quad (1)$$

where A was actual profit,

F was forecast profit,

T was the forecast interval in months,

S was size as measured by actual profits,

R was risk as measured by market beta,

I was a dummy variable representing industry class, and

e was the unexplained error term with the property $N(0, \sigma)$.

The maintained hypothesis (P_9) was that each of the four independent variables (forecast interval, size, risk, and industry category) should simultaneously help explain the size of the relative or absolute relative forecast error. However, without the benefit of the simple two variable regression results one might expect there to be multicollinearity between R (risk) and S (size), since the latter is likely to reflect some degree of diversification in the activities of a firm.

A priori reasoning would also indicate the following in terms of the two versions of the model. Firstly, where the relative forecast error is the dependent variable, the intercept α_0 has no useful meaning; $\alpha_1 \neq 0$ (signifying a relationship between the size of relative prediction error and forecast interval); $\alpha_2 \neq 0$ (signifying no systematic linear relationship between relative forecast error and size, though it might be U shaped); $\alpha_3 \neq 0$ (indicating a relationship between relative forecast error and systematic risk); and $\alpha_4 > 0$ where relative forecast accuracy is easier to achieve for firms in consumer goods manufacturing and the services sector, or $\alpha_4 < 0$ where it is more difficult. For the absolute relative error version of the model one can be rather more positive. Thus while α_0 again has no useful meaning, one might expect $\alpha_1 > 0$ (indicating that absolute forecast error and forecast interval are positively related); $\alpha_2 \neq 0$; $\alpha_3 > 0$ (indicating that absolute forecast error and systematic risk are positively related); and $\alpha_4 > 0$ or < 0 as before.

The null hypothesis tested was:

$P_9: H_0$ —When examined simultaneously, forecast interval, size, and risk category and industry group membership individually have no statistically significant impact on the size of the relative or absolute relative forecast errors.

The results for the linear models for the amended second data file were as follows:

$$\frac{F-A}{F} = -0.05 + 0.00T + 0.00S + 0.00R + 0.08I \quad [\bar{R}^2 = 0.159] \quad (2)$$

(0.05) (-7.72) (-0.02) (2.82)

$$\left| \frac{F-A}{F} \right| = 0.17 + 0.01T + 0.00S - 0.06R - 0.04I \quad [\bar{R}^2 = 0.160] \quad (3)$$

(3.46) (6.28) (-1.04) (-1.65)

The t statistics, which can be used to ascertain whether or not the coefficients are significantly different from zero, are given in brackets below each of the independent variables. In terms of the relative forecast error (equation (2)) they are significant at the 95% confidence level for size and industry, but not for forecast interval or risk. By contrast, in terms of the absolute relative forecast error (equation (3)) the t statistics are significant at the 95% confidence level for forecast interval and size, but not for industry or, again, risk. In both cases the $\bar{R}^2$ statistics are poor, and dropping either R (risk) or S (size) from the equations to eliminate possible multicollinearity did not improve the models' performance. Overall, the most that can be said from the above results is:

- (i) In the case of both equation (2) and equation (3) there is some evidence of a slight positive relationship between accuracy and forecast interval, but this is only significant in relation to absolute relative error.
- (ii) There is indeed no linear relationship between size and forecast accuracy.
- (iii) The expected relationship between forecast error and systematic risk is not borne out: in neither equation are the estimated coefficients significantly different from zero, and in equation (3) the sign is negative, not positive.
- (iv) In terms of equation (2), forecast accuracy appears to be better for firms in the 'services' sector (which is what might be expected), and the estimated coefficient is significantly different from zero. However, in terms of equation (3) it appears that forecast accuracy is instead better for firms in the 'heavy manufacturing' sector, though the result is not statistically significant.

The results of running the models on the third file data were even more disappointing, none of the t values being significant at the 95% confidence level, and the $\bar{R}^2$ statistics being even weaker.

Overall the evidence is hardly sufficient to reject the null hypothesis. Perhaps the only comfort to be drawn from the experiment was that the models worked even less well when the forecasts of the three naïve prediction models were substituted for F in the dependent variable terms: for instance, in the case of the absolute relative error version the $\bar{R}^2$ statistics were zero for naïve models (1) and (3),

and <0.04 for model (2), irrespective of which data file was used.¹⁵

Although more positive results might have been expected than those which transpired, it ought to be noted that in their study on prospectus forecasts, and using path analysis Ferris and Hayes (1977) also found little explanatory power in terms of firm size, forecast interval and even year of forecast. However, the lack of any simple explanation of forecast accuracy might be taken to suggest that professional analysts' profit predictions produced by their 'black box' models are potentially helpful to the investing public. This would not deny the possibility, though, that it might be feasible to develop relatively sophisticated time series or causal models which might perform as well as, if not marginally better than, financial analysts in projecting future profits. But the costs of collecting and processing the data would be far from negligible, and it might not be worthwhile for individual investors to incur such expense.

Summary and conclusions

Analysis of three cross sectional data samples showed that relative prediction errors were negatively skewed, indicating a tendency on the part of professional analysts to underestimate future profits for the periods under review. Overall, about one-third of relative prediction errors fell within a $\pm 5\%$ range, a half within $\pm 10\%$, and three fifths within $\pm 15\%$, while the mean absolute relative error was around 10–15%. In general terms these results are not greatly dissimilar to those of other UK studies relating to prospectus profit forecasts and predictions made in merger documents, where however company executives may be influenced by behavioural considerations (Ferris, 1975). However, while univariate analysis seemed to imply that forecast interval, company size and industry category (but not systematic risk) might be important explanatory variables, such an impression could not be confirmed when multivariate analysis was undertaken.

As regards performance, the results of the study (like previous research on brokers' and executives' predictions, with the exception of work by Green and Segall (1966, 1967)), show that analysts' forecasts out-perform those produced by simplistic mechanical prediction models. But whether more sophisticated time series or causal models can

forecast almost as well as analysts remains an open question, though from a practical viewpoint it would seem that it might be more helpful if a number of standard deterministic simulation models could be developed for use by professional forecasters.

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¹⁵This was confirmed when equation (1) was modified, substituting actual profits as the dependent variable and introducing a profit forecast variable on the right hand side. This model performed extremely well when brokers' predictions were introduced as the new independent variable, and considerably better than when the naïve forecasts were substituted in their place.

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Walter Taplin Prize

The British Accounting Association, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £100 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin. The winning article in 1982/83 was "The Political Implications of Accounting and Accounting Standard Setting" by David Solomons (Spring 1983).

Contract Value Accounting and the Monitoring of Managerial Performance: An Agency-Based Proposal

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Introduction

The aim of this paper is to advocate, within the accrual accounting framework, a method of reporting current market values for assets which will act as a partial signal of managerial expectations about the future prospects of the firm. On the basis of these asset valuation procedures a scheme for the *ex post* evaluation of managerial performance is tentatively suggested using the notion of excess current income.¹ Viewing financial accounts as the means by which a remote shareholder body and other investors assess managerial stewardship, it is considered important that the results reported in the accounts ought to be capable of verification by independent auditors—using whatever criteria are considered to be professionally acceptable. For this reason, it is considered inappropriate that accounts be based on asset valuations which are subjectively made by management. Managerial estimates of present value (PV) for assets are thus considered unacceptable. This view effectively debars the eclectic 'value to the firm' (VF) concept.²

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¹The concept of excess current income plays an important role in the system of performance appraisal developed by Edwards and Bell (1961, pp. 66–69) and expanded upon in Edwards (1977, 1980). Anthony's (1975) proposal, criticised recently by Amey (1980), for charging interest in accounts as a cost of equity capital, is a similar but essentially different idea to that of excess current income. The present proposal allows the monitoring procedure to be accomplished by means of supplementary accounting, and does not require incorporation of the interest charge in financial accounts as is the case with the Anthony proposals.

²The VF concept allowing assets to be valued at either NRV, RC or PV has a long academic history. Wright (1964) attributes an understanding and advocacy of the technique to Canning (1929). Solomons (1966), following Bonbright's (1937) analysis, did much to draw wider attention to the concept by setting out the various alternative cases in inequality form, and by advocating use of the concept for financial accounting purposes. Baxter (1967, 1975) and Parker and Harcourt (1969) were other influential advocates.

For financial reporting purposes, management would be required to make a choice at the end of any accounting period between the current market values—either net realisable value (NRV) or replacement cost (RC) for each asset. If management choose the current value for any asset which nearest reflects their expectations of its contribution to the expected present value (PV) of the firm, then investors will be provided with an attainable estimate of management's view of the value of the firm as a going concern. This approximation of management's view of the value of the firm may not only represent a practical means by which management partially signal their expectations, but may also provide investors with a better base on which to estimate firm value than other accounts based alternatives, i.e. accounts reporting only NRV or only RC valuations.³

Where assets contribute jointly to the earnings of the firm, then the choice of current value can be determined by comparing aggregate RC and aggregate NPV for any group of assets—with management's expectations of the PV contributed by that group to the firm's value. For reporting purposes, management are required to determine the market based RC and NRV for each group of assets. The rank order between these values and management's view of their PV must be established. The value reported in the accounts will be the closest attainable market value to PV. As this approach can operate without the need to determine a single point estimate of PV, the information demands of this system of reporting may be more easily

³Stamp (1979) comes to the conclusion that dual sets of accounts are best when he says: 'How, then, do we choose between RC and NRV? I believe that the answer to this conundrum is very simple: no choice is necessary, and both figures should be reported in separate columns'. The reasoning following by Edwards and Bell (1961, p. 97), and elaborated in Edwards, Bell and Johnson (1979, p. 645) leads to the view that both replacement cost and net realisable value data (the latter in supplementary records) should be maintained. In their view, 'Entry values are needed to evaluate what the firm set out to do and actually did do in the period under consideration—exit values are needed to evaluate an alternative that the firm might choose in preference to what it is currently doing'.

fulfilled than those which require the publication of estimates of PV.

It should be noted that, under the proposals of this paper, where management's choice between RC and NRV for any asset depends upon the relationship of these values with the anticipated PV for the asset, the auditors are not expected to verify the *choice*. The role of the auditor is to certify that the NRV or RC values chosen by management were in fact the values current in the market at the date of accounts. It is not assumed that current values can be observed with precision but that generally accepted rules will exist enabling *estimates* to be verified by the auditors.

The proposals of this paper fall into two parts: the first concerns the development of the advocated asset valuation technique—referred to as contract value accounting (CoVA), highlighting its *ex ante* signalling properties and contrasting it with alternative valuation systems. The final two sections of the paper are devoted to considering the opportunity that provision of CoVA data might allow for the *ex post* evaluation of managerial performance. Because CoVA data act as only a partial signal of managerial expectations, and also because choice of a target rate of return to compute target income and excess current income might be a subjective exercise, these final two sections have to be looked upon as exploratory and more tentative than the proposals advocating adoption of CoVA. For ease of exposition, it is assumed that firms are all equity financed.

Asymmetric information and contract value accounting

The proposals which follow are suggested as a means of providing financial accounting information useful to investors. It is assumed that, in general, markets for goods and services are imperfect and incomplete. It is further assumed that expectations about future outcomes affecting the firm are not shared by management and investors—in short, asymmetric information exists. In such a world, the annual financial accounts of firms may provide investors with some insight into managerial expectations and into the extent to which managerial performance *ex post* matches those expectations.

The first aim of this paper is to suggest an approach to asset valuation which allows management to provide a signal to investors of their expectations about the level of future returns to the firm. This signal is such that audit tests might be applied to verifying that the asset values reported by management reflect current market values. Consider the implications which might be drawn from asset values reported in financial accounts by management. In order that management be justified in retaining resources in the firm, it is

necessary that their expectations lead them to believe that aggregate NRV—given by total receipts less selling costs anticipated from immediate forced sale of the assets of the business—be less than the PV of the firm valued as a going concern. Taking

$$\sum_i^n \text{NRV}_i (i = 1 \dots n)$$

as the sum of the separately identifiable NRVs for individual assets or groups of assets, the relationship

$$\sum_i^n \text{NRV}_i \leq \text{PV}$$

for the firm as a going concern ought to hold. A minimum condition for continuation of the business therefore ought to be that management anticipate future returns on aggregate NRV to be at least equal to or greater than the return required by shareholders on that sum.

From the above analysis it is possible to view the relationship between management and the separate ownership group as that existing between agent and principal. Management acts on the principal's behalf to choose the most preferred investment projects, subject to earning a return at least equal to the shareholders' required rate of return. As a consequence of the values reported for assets by management in the financial accounts, a further inference can be made. Management anticipates that future returns when discounted by the shareholders' rate of return will give rise to a PV at least equal to the summed asset values reported in the accounts. Viewed in this light the values at which assets are reported in the balance sheet can be looked upon as if they constitute 'bids' made by management to the shareholders for the assets management have decided to retain in the business. In order to justify retention, management, as agent, have to bid at least NRV. Where management anticipates for any asset, or group of assets considered jointly, that $\text{PV} > \text{RC} > \text{NRV}$, then management could bid RC for such assets. Reporting RC in the financial accounts in this instance would serve to inform shareholders of management's higher expectations. Management here can afford to bid the higher RC value given their expectations that $\text{PV} > \text{RC}$.

It follows that the values bid for assets in the balance sheet imply managerial expectations of being able to earn a return in future such that $\text{PV} \geq$ the value bid. This notion of bidding applied to managerial valuation of assets can be viewed as if management makes an implicit contract with the shareholders to earn at least the shareholders' required return on the asset values reported. It is for this reason that the type of accounting advo-

cated here is referred to as contract value accounting.

Methodology

For Hicks (1946, p. 179), when considering individual or social income, *ex post* income measures "have no significance for conduct" and therefore are not useful for economists. The setting of the present paper, focussing on the measurement of income for firms where owners are separate from management, suggests that Hicks' pessimistic view about the usefulness of *ex post* income may not be universally valid.

This paper's proposals are based on the idea that, in financial markets, multiple equilibria may be possible—where any equilibrium is conditional on the information set available. For the purpose of this paper, the aspect of the information set focussed upon is that which relates to the contents of financial accounts—given by the conventional methods used in reporting accounting values, and the analytic techniques relied upon by investors in interpreting the accounting numbers reported. Techniques currently used by preparers and users of accounts are taken to reflect the effects of education and conventions which have evolved over time. Current equilibria in financial markets are thus viewed in part as a consequence of the role played by these factors in shaping the nature of the information provided to the market. The thesis of this paper is that improved equilibria may be achieved as a result of the development and implementation of superior accounting techniques. A role would therefore seem to exist for normative research in accounting which strives to develop superior techniques better suited to contemporary conditions than those which are perhaps the product of influences which lie more in the past than in the present. Reference to the principal-agent paradigm allows the accounting proposals of this paper to be viewed in terms of criteria characteristic of that analysis. Two types of problem can arise where shareholders as principals have incomplete knowledge of, or control over, the action of the agents—the firm's managers. Firstly, shareholders may *ex ante* be unable to measure the quality of the managers they employ. As a result, owners may tend to offer rates of remuneration appropriate to the average quality of managerial services offered in the market. Better than average quality management would thereby be under-rewarded and under-supplied, and relatively poorer managerial services be over-supplied. This is known as the problem of adverse selection.⁴ The accounting proposals advanced in this paper may

provide investors with information which serves to reduce the likelihood of adverse selection arising. Because of the *ex ante* aspect of the accounting values reported, better quality management can signal their expectations via the financial accounts to investors. *Ex post*, with the aid of the monitoring technology suggested below—based on CoVA asset valuation procedures—investors may be aided in arriving at an informed opinion of how well management have performed against their signalled expectations.

The second problem arising from separation of ownership from control arises from the freedom management might have to pursue actions which favour their own interest against the interest of the shareholders. Once again *ex post* reports of accounting income, verified by independent auditors, can provide an efficient means of ensuring that the cost to owners from moral hazard are kept to an acceptable minimum.⁵ Indeed, to the extent that the scheme of accounting proposed—linking *ex post* results to *ex ante* signals—allows more effective appraisal of managerial performance—then moral hazard type costs ought to be reduced.

Use is made of the principal-agent paradigm to illustrate the nature of the new equilibrium which might obtain after the adoption of the advocated accounting techniques. It is therefore appropriate to offer an explanation as to why, given that the new equilibrium would allow better quality managers to benefit from signalling their expectations, we do not observe such managers on their own initiative adopting the signalling techniques advocated here. The explanation, as offered above, may relate partly to the absence of knowledge about the appropriate techniques. However, even if management had knowledge of these techniques—and were prepared to use them—no pay-off would accrue if the traditional methods of evaluating managerial performance and designing reward schedules remained unchanged.

Consider the following analogy. There are two residential locations—one good, the other bad. In the first area everyone paints their houses regularly as the cost of not doing so, were they to sell, would be greater than the cost of keeping the property in good repair. In the other area, no one paints houses as even smart houses sell poorly because of the seedy neighbourhood. Similarly, managers may be quite happy to go along with the current reporting climate as no pay-off might arise if they were individually to switch to a 'better' reporting system—the remuneration paid to managers may continue to be determined on the basis of 'current' conditions. This analogy is also useful in illustrating the likelihood that different market

⁴The effect of the bad driving out the good, given information asymmetries, was explored by Akerlof (1970) in the context of second hand car markets.

⁵Beaver (1981) and Ross (1979) analyse the case for financial disclosure as a means of avoiding the problem posed where information asymmetries exist.

equilibria may exist simultaneously, e.g. as between small, badly researched firms and larger companies required by law to disclose more information and whose prospects are more thoroughly researched by the investing community. Given the inert influence of convention, reinforced perhaps by legislative rules and accounting standards, movements from any existing equilibrium may only in practice be possible by recourse to the authority of either the legislature or the accounting profession. For the remainder of this paper the accounting techniques advocated are described in terms of their expected behavioural consequences in the equilibrium brought into being by their adoption.

It is argued below that the adoption of CoVA and the excess current income technique advocated by Edwards and Bell (1961) may provide investors with a cost effective means of constraining management from undertaking action which makes managers better off but shareholders worse off. The advocated techniques lie within the conventions on which annual inflation adjusted accounts are currently prepared—no substantial learning costs by management, auditors or investors ought to be involved. Any extra work would be negligible—no burden is imposed on management to report subjective values in accounts—or on auditors or investors in attempting to verify these values.

A further benefit exists where, given incomplete markets, accounts fulfil a role in providing information on which investors arrive at a view on share value. CoVA allows management to partially signal their expectations about the future. This intermediate step may well be more cost effective and operational than requiring publication of cash flow forecasts. This latter area poses problems about subjectivity of estimates, time horizons and usefulness for appraising performance (Egginton, 1984).

Contract value accounting: characteristics

Contract value accounting has two fundamental characteristics. First is the reliance on objective market prices, either RC or NRV. Subjective values are excluded. This feature aims to minimise the burden facing owners or auditors, as outsiders, of having to interpret and rely upon income figures and asset valuations which they have no satisfactory way of verifying. More specifically, no effort is made to account for any element contributed to the value of the firm as a result of effects arising from assets being used in combination. In particular, the intangible item known as goodwill is excluded from the items to be accounted for in financial accounts. Assets to be accounted for are those which have a tradeable property right which

exists separately from the other assets of the firm.⁶ This implies that purchased goodwill and any expenditure on its maintenance, e.g. on advertising campaigns, should be written off to profit and loss account as they are incurred. The reason justifying this treatment in the present paper is as follows. Management's decision to hold assets effectively charges them with the responsibility of earning the shareholders' required rate of return on the assets held. Apart from the practical difficulties faced by outsiders in verifying any value placed on goodwill, it also seems unreasonable that management should be charged with the possession of an 'asset' that they are unable to realise separately from the other assets of the firm.

The second important feature of CoVA is the manner in which it is envisaged that management will arrive at the decision on the appropriate market value to apply to assets for financial accounting purposes. Decisions about valuation involve management comparing the expected value of outcomes for assets with the current market values for those assets. Management are thus viewed as having taken resource allocation decisions prior to the preparation of the financial accounts. The investment planning procedures and the data necessary to allow management to arrive at allocation decisions will form part of the management accounting records maintained to facilitate the internal planning and control of the operations of the enterprise. On the basis of these records management in arriving at investment decisions will have formed a view—more or less precisely—about the level of returns anticipated in the future. It is on the basis of this view that management are considered able to carry out the ranking, for financial accounting purposes, between PV and current market values for assets owned. Investment and control decisions are thus viewed as being based on management accounting data. Financial accounts on the other hand—as external reports—are considered the means by which management might signal to investors the effect of investment decisions taken, and also to provide the means whereby *ex post* managerial performance might be appraised.

Attention is now focussed on the *ex ante* signalling properties of CoVA and the rules to be followed in selecting market values for financial accounting purposes. Taking the firm as a whole, management are justified in retaining resources in the firm at the start of any period so long as the PV that management expect from retention exceeds the amount obtainable from an immediate

⁶This rule is identical to that adopted by Chambers (1966) in defining assets as severable; goodwill is not severable and so should not be accounted for as an asset. The idea that goodwill is not an asset to be accounted for in financial accounts is not a new one. Canning (1929) states this view and cites the earlier writing of Paton (1922) in support.

sale of assets owned, less the costs of that sale. This aggregate NRV can thus be looked upon as the shareholders' minimum opportunity cost of allowing management use of shareholders' funds. Consequently, the minimum aggregate value bid by management in terms of the asset values reported in the financial accounts ought to at least equal aggregate NRV. Aggregate values reported higher than the NRV minimum thus signals to investors the expectation of a PV for the firm greater than or equal to the total asset value reported in the accounts.

The CoVA approach is envisaged as operating on an asset by asset or activity by activity basis. The more asset-specific are management able to make the application of the CoVA calculus, then the greater will be the flexibility available to management in selecting between RC and NRV in reporting asset values—and the closer will be the signalled aggregate asset values to management's expected PV for the firm as a going concern. The conditions necessary to allow separate considerations for any asset is that its PV contribution to the enterprise be independent of what is contributed by other assets or activities.⁷ It may be the case that few assets viewed on their own satisfy this condition. Consideration of assets in groups at the activity level which satisfies the independence condition will then be necessary. In practice, for any business it is extremely unlikely that no activity exists within the firm which cannot be considered as independent from the rest of the firm. Every 'make or buy' alternative favouring the 'make' outcome offers an opportunity for independent appraisal—where PV is given by the costs saved by making internally. Comparison of this PV with the summed RC and summed NRV values for the assets relating to the 'make' decision then allows either RC or NRV values to be applied to the assets of that activity. The point here is that management are continually obliged to arrive at decisions which imply ranking of benefits and costs at a sub-entity level. Given decisions based on such rankings, management ought to be able in turn to compare expected benefits with current market values for financial reporting purposes. As a consequence of the independence condition, the summed aggregate of the market values that management choose to report for assets will be less than managements' expected PV for the firm as a going concern.

To recap, under CoVA it is envisaged that management will value assets, either individually or in groups—defined by activity, at the market

value for the asset(s) which provides the nearest attainable indication of the expected PV arising from retention of the asset(s). So long as PV is greater than the market value reported, management will expect to be able to report in the future a return on the asset value selected which exceeds the shareholders' required return. Thus management can 'afford' to bid any market value less than PV. Secondly, it is argued later that it may be in management's interest to bid the highest market value which they can afford, i.e. that which ranks nearest to PV.

Insight into the results arising from applying the CoVA calculus can be obtained by use of the matrix often relied upon to illustrate the VF valuation technique. CoVA values are indicated (') while those arising under VF are indicated (✓).

- | | | |
|---------------------|---------------------|-----|
| (✓) | (✓) | (') |
| (1) $NRV < RC < PV$ | (4) $RC < NRV < PV$ | |
| (') | (✓) | (') |
| (2) $NRV < PV < RC$ | (5) $RC < PV < NRV$ | |
| (✓) | (✓) | (') |
| (3) $PV < NRV < RC$ | (6) $PV < RC < NRV$ | |

The contract value rule indicating the bid management should make for assets held can now be stated very simply: bid NRV for all assets except those where case (1) arises, i.e. where $NRV < RC$ and PV is greater than both, then RC ought to be bid. If this rule is followed then management will report an aggregate value for assets in the balance sheet which can be interpreted by investors as an attainable signal of management's expected PV for the firm as a going concern. Contrariwise, management provide a signal of value which does not falsely raise the expectations of investors regarding the level of returns management anticipate in the future.

It is now appropriate to consider why it might be in management's interest to seek to provide the best conservative estimate, based on current market values for assets, of their view of the value of the firm. Consider the adverse selection problem mentioned earlier. In the absence *ex ante* of information on which to judge differential managerial quality, managers of above average ability may be offered remuneration less than their ability warrants, and owners may end up paying more than they ought to managers of less than average quality. One way in which better management can identify themselves is by reporting current market values which provide a signal of the benefits they anticipate from their investment decisions. Good management obtain no benefit from signalling less than their expectations warrant, while poorer management face a cost of failing in future to satisfy investor expectations if over-optimistic signalling is relied upon. A further incentive encouraging managers to signal a value of the firm as high as asset

⁷The notion of economic independence is an important one in capital budgeting. Where the probability distributions of all the other activities undertaken by the firm would be unaffected by the adoption of the project under consideration then that project can be appraised on its own and the value additivity rule applies. See Haley and Schall (1979, pp. 164-166).

market values and their own expectations warrant concerns their security of tenure. Investors' expectations of the value of the firm are assumed to be influenced by the value reported for the firm in the financial accounts. Where markets operate efficiently then the higher the attainable value management signal for the firm, the less likely will be the threat of takeovers and possible loss of managerial tenure. Where markets are less than fully efficient the adoption of an accounting technique which provides investors with more information about managerial quality is likely to lead to an improvement in the efficiency with which resources are allocated.

In practice, the markets for partly used assets may be highly imperfect and it may be difficult to obtain market prices for the firm's severable assets. In such cases, it may be necessary to have recourse to generally accepted indices as a second best means of determining current prices. However, for a particular subset of assets this second best strategy may fail to provide prices which are capable of independent verification. Particular examples are trade marks and patent rights. As these assets are severable, they ought to be accounted for by management. Severability implies a tradable right which could be realised by management. The sum receivable represents an opportunity cost to the shareholders and so ought to be included in the end period accounts—partly so that management may better signal their expectations regarding PV—and in part so that management may be charged with the responsibility of earning, *ex post*, at least the shareholders' required rate of return on the minimum opportunity cost they incur by allowing management to retain use of their capital.

In most instances the appropriate contract value for rights such as trade marks and patents will be NRV, i.e. $PV > NRV > RC$ —where RC represents the current cost of inputs which led to the creation of the item or idea protected. However, because of the highly specific nature of these rights, and the extreme thinness of any market in which they might be traded, determination of NRV is not likely to be possible. No previous trades of exactly the same type of rights as now owned may have taken place, and even if they had it may not be possible to construct a meaningful price index reflecting economic changes over time. Faced with this difficulty, management may be forced to adopt a third best strategy. This would involve valuing the rights, protected by trade marks or patents, at the RC of the inputs which contributed toward the creation of the protected rights. Where this occurs it will be appropriate that the shareholders be informed where such third best alternatives have been adopted, and descriptions be provided in the accounts to allow shareholders to form a view on likely future outcomes in connection

with these assets. In particular, it may be helpful if management were to reveal the expected life of the protected right, and any impact that its lapse or sale might have on the earning capacity of the firm.

CoVA compared with VF

The setting out above of the alternative value relationships, which can apply to any asset, provides an opportunity to compare CoVA with the value to the firm (VF) technique which has attracted considerable support in academic, governmental and professional accounting circles.⁸ CoVA, in common with VF, can be looked upon as avoiding the rigidity of adhering to either all NRV or all RC, in one set of accounts. Both techniques thus allow recognition of the fact that assets belonging to different segments of a firm's business may warrant valuation at RC or NRV. Because of the elimination of the subjective valuation (PV), CoVA avoids the theoretical and practical difficulties which attach to the VF technique (Chambers, 1971; Gee and Peasnell, 1976; Ma, 1976; Peasnell, 1978; Stamp, 1979; Wanless, 1974). A further important difference between the two is that under CoVA it is the maximum market price management are prepared to bid for any asset which is reported in the financial accounts. By their choice of bid price management effectively contract to earn at least the shareholders' required rate of return on the price bid (i.e. the price at which the asset is valued in the balance sheet). Under VF the appropriate value for any asset is given by the least cost the firm would face as a result of a hypothetical deprival. In terms of providing signals about management's expectations of the future, the CoVA technique provides information superior to the VF approach. Consider cases (2), (4), (5) and (6), where both techniques give rise to different results. In every instance CoVA provides a superior indication of the future levels of expected returns, while at the same time setting a target for future managerial performance which management expect to be able to attain.

In general, under CoVA, it is NRV which applies in most cases while for VF, RC valuations dominate. Whether or not CoVA when applied in practice will give rise to a predominance of NRV in accounts, will depend on the circumstances faced by firms in the activities they pursue.

The view taken in this paper is that while the VF technique provides a worthwhile tool for decision

⁸The Sandilands Committee (1975) advocated adoption of 'value to the firm' in valuing assets for financial accounting purposes, and the concept has also been incorporated into the UK and US professional accounting standards, SSAP 16 (1980) and FAS 33 (1979) respectively.

making in the context of management accounting, it does not perform as well as CoVA the task of reporting asset values for financial accounting purposes. The above arguments lead to the conclusion that the CoVA technique is superior to the VF technique, and that the latter ought to be abandoned in favour of the former as a means of reporting asset values for financial accounting purposes.

CoVA compared with Edwards and Bell

As the proposed method of monitoring the performance of management outlined in the following section relies closely on the concept of excess current income developed by Edwards and Bell, it is appropriate to identify the differences between their approach to income measurement and the CoVA approach proposed in this paper. Edwards and Bell indicate their view of the prime purpose to be served by accounting data when they say (p. 3): 'It is in the evaluation of business decisions, we believe, that the demand for accounting exists.' It is clear throughout their work that the income figure reported in the profit and loss account, and the valuation bases applied to assets and liabilities in the balance sheet, provide the context in which accounting data performs its evaluatory role. Further, its prime purpose is to serve management (p. 4): 'Thus it seems safe to concede that accounting information must principally serve the functions of management', and the needs of outsiders are served second-hand and by the way: 'That outside users of accounting data such as stockholders... are mostly by-product beneficiaries is undeniable,' though they consider the needs of both to be similar when they conclude (p. 5): 'It should not be surprising then if the same set of accounting principles can be used to develop data suitable to external as well as internal users.'

In focussing on income measurement as the means by which management evaluate their performance and take decisions about internal resource allocations, Edwards and Bell impose a role on financial accounts which they are not designed to serve. Financial accounts traditionally are the medium through which management are accountable to their shareholders. The aim of Edwards and Bell, in allowing management to evaluate, plan and control its own performance, has traditionally been served by management's own internal *management* accounts. Indeed, the Edwards and Bell statement of the purposes of accounting data⁹ reads like a

good description of the aims of any set of management accounts.

Under CoVA, financial accounts are viewed as serving a completely different purpose to the managerial accounting function which Edwards and Bell impose upon them. The traditional view of financial reporting is retained. Financial accounts are to be drawn up as the means whereby management are held accountable to their shareholders, and asset values are chosen on the basis of managerial accounting information, after resource allocation decisions have been taken. The implication of this line of reasoning is that the Edwards and Bell view of the role of financial accounts is suspect. Financial accounts are neither a proper nor an adequate basis for the taking of resource allocation decisions by management. Adoption of CoVA would oblige management to adopt the sensible sequence of actions of first taking investment decisions on the basis of the relevant *ex ante* information, and only then proceeding to value assets for financial accounting purposes. This discipline provides a further reason why CoVA might be considered preferable to other current value alternatives for financial accounting purposes.

The inappropriateness of the Edwards and Bell scheme, burdening the financial accounting function with that of management accounting,¹⁰ is made clear by their consistency, in discussion and by worked examples, in choosing a *single* activity firm. It is not evident how *ex post* evaluation, and allocation decisions, are to take place based on aggregate data, i.e. the income figure reported in the financial accounts, where the firm engages in a number of different activities some of which may be worth continuing while others should be discontinued. The severity of this limitation becomes clearer in the more recent writings of these theorists¹¹ when they illustrate their decision procedures with reference to the eclectic valuations which may arise under the application of the value to the firm concept. A sequence of decision signals (traffic lights in their terminology) is determined from *ex post* rates of return arising where either RC and/or NRVs are used as the basis for financial accounting. It is extremely difficult to see how the myriad of 'hold or liquidate' decisions which any normal firm faces, can be satisfactorily taken on the basis of these aggregate rates of return based on financial accounting data.

The monitoring procedure

The procedure by which managerial per-

⁹These are given (p. 4) as '... (1) to the control of current events in the production process, (2) to the formulation of better decisions in the future and (3) to the modification of the decision-making process itself'.

¹⁰Where management's objective might be considered to be to seek to maximise the value of the firm. This is a reasonable managerial objective where the market in managerial services is efficient and the takeover threat operates effectively.

¹¹Bell and Johnson (1979, pp. 120-123) and Edwards, Bell and Johnson (1979, pp. 641-645).

formance might be appraised rests on two pieces of information. First is the aggregate figure bid in the financial accounts by management for assets held at the end of the period. Next an estimate must be made by management of an appropriate rate of return which, when applied to the end period value of assets reported by management, will provide the target income figure by which managerial performance in the following period can be evaluated. Consider the aggregate asset value reported. The size of this figure has two effects. *Ex post* it determines the level of income reported for the accounting period. *Ex ante* it provides the benchmark from which a target income figure can be derived and against which the actual income of the following period can be appraised. Clearly both income *ex post*, as well as *ex ante* expectations, will depend on the aggregate bid made by management for net assets. It is therefore important to consider the constraints which might exist to ensure that management refrain from misrepresenting the position of the firm by the bids they make for the net assets. The presence of normal audit checks ought to ensure that management are prevented from bidding above the higher market price for each asset held. Conversely, a motive for income smoothing in a downward direction may exist whereby management might wish to understate *ex post* income to lower investors' expectations for future returns. A lower bound constraining this desire will be the rule that management choose at least NRV—again audit checks can ensure that this is complied with. NRV is the least amount shareholders can sensibly allow management to bid for the assets of the firm. Should management feel unable to obtain $PV \geq NRV$ for any asset or indeed for the firm as a going concern then liquidation of the asset or the firm ought to take place. An alternative to the latter outcome is the replacement of the current management with a more efficient set of managers.

The role played by the auditors in certifying the accounts prepared by management under CoVA can now be described. While management in valuing assets are required to rank current market values against their estimate of PV for the asset or group of assets considered, auditors have no role to play in verifying this ranking exercise. This is because of the unobservable nature of management's estimate of PV. The role of the auditors is limited to certifying that the NRV or RC values for assets reported in accounts are in fact those which currently stand in the market for the assets concerned. In practice, as was stated earlier, it may not be possible for management to rely on directly observable market prices for identical assets. In such cases an estimate may have to be made relying perhaps on a combination of price indices and expert opinion. The problems here in estimating current values are no different from those which

apply to any other current value based approach to accounting which relies on the reporting of RC or NRV. It is anticipated that over time audit procedures will evolve based on professional recommendations which will allow auditors to verify that management's choice of NRV or RC reflects current market prices.

A possibility still exists for management to choose the NRV price, while their own information suggests that a higher RC price could be bid. The protection from income smoothing in these cases would lie with the forces tending toward market efficiency. Better quality management have an opportunity to signal their ability by choosing the higher market price below their estimate of PV. There appears little reason why management should not aim to provide the best attainable estimate of their own expectations—as signalled by choice of market prices. Higher values reported in accounts would be likely to raise investors' expectations about the level of future earnings. This in turn would be reflected in a higher market value for the firm in the market place, and thus provide some defence against the threat of takeover, as well as improving the reward prospects for management where over time they are observed to be able to attain the targets signalled.

Managers wishing to provide over-optimistic signals by reporting asset values higher than warranted by expectations of PV face the prospect of failing in future to be able to attain the over-optimistic targets signalled. As is explained below, any shortfall of actual income against target in any period ought to be carried forward and added to the target for the next period. Audit checks prevent management reporting asset values greater than their current market values. Thus, managerial discretion is here limited to reporting the higher of NRV and RC where it ought to have been the lower value. The scope available to management to postpone their day of reckoning by reporting higher end period values to cover a deficit caused by over-optimistic valuation in previous periods is thus limited on two fronts. Firstly it is limited by the carry forward of past deficits and secondly by the constraints placed on the values management may apply to assets owned.

The level of income that management ought to earn will be given by the product of aggregate CoVA asset values and the rate of return required by the shareholders. Two points must be made regarding the nature of this *ex ante* signal. Firstly, because only severable assets are accounted for—those which impose on management an opportunity cost by their retention in the firm—the signal of future income must by necessity be the minimum which ought to be earned. No signal is made of the return anticipated from goodwill—the unobservable asset. Secondly, and perhaps more importantly, in order to arrive at a figure for target

income based on CoVA asset values reported, an estimate must be made by management of the shareholders' required rate of return. While management may have an implicit notion of this variable in order to make investment decisions, this state of knowledge may be far short of any consensus between management and investors about what, *ex ante*, the required rate of return for the period should be. Because of the unobservable nature of this rate, problems face the auditor in verifying the data which forms the basis of the performance evaluation procedure—identification of the target income for the period.

For these reasons, the proposals to be made regarding the setting up of the *ex post* monitoring procedure must be considered exploratory in nature. The excess current income technique of Edwards and Bell, on which this monitoring proposal has been based, has so far only been advanced for use by management in the *ex post* appraisal of their own expectations. Here it is tentatively suggested that the technique may prove beneficial to investors evaluating managerial performance with a view to setting a value on the firm. Provision of information in the form suggested as a supplementary statement in financial accounts, based on CoVA values, may have an educative effect on investors' evaluation procedures and may cause expectations to be more clearly framed.

Because of the speculative nature of the proposals made for monitoring performance *ex post*, various different approaches toward applying the monitoring technology are now explored. Special emphasis is placed on the information requirements with respect to the choice of required rate of return in order to compute the target income figure. The choice of the rate of return to apply to the minimum benchmark stock of assets will determine the character of the hurdle against which actual income for the period is to be appraised.

It follows that a valid comparison of target income and actual income requires each to be measured in similar terms, i.e. in real or nominal terms. Use of CoVA for asset valuations allows income to be measured in either real or nominal terms. The monitoring technique based on the concept of excess current income, used in conjunction with CoVA, can be applied equally to real or nominal terms income measures. However, the quality of the appraisal may differ depending on the view taken of the relative merits of real terms income measures, compared to income measured in nominal terms. Where income is measured in real terms then a real terms hurdle rate of return is appropriate, otherwise a nominal rate of return should be used for appraising reported nominal income. Table 1 indicates the choice set available.

Measuring income in real terms allows fair comparisons to be made of a firm's performance over time. The gains and losses accruing to share-

Table 1

Measurement Basis	Rates of Return to be Applied to Beginning Period Net Assets		
	Zero	Risk Free	Risk Adjusted
Real terms	(1)	(3)	(5)
Nominal terms	(2)	(4)	(6)

holders from corporate borrowing and lending, where changes in the general level of prices occur, are also measured in a satisfactory manner (Edwards and Bell, 1961; Sweeney, 1964). For these reasons, real terms measures are considered to be preferable to nominal terms income measures. The remainder of this paper is written with reference to this choice, and hurdle incomes arising under alternatives (2), (4) and (6) are not considered further. Consider the three real terms alternatives available. The first, interestingly, is a 'do nothing' alternative, i.e. a zero real rate of return is applied to the opening balance for net assets; the hurdle income is zero and actual income reported is excess current income. If real risk-free rates of return for the period are zero and shareholders are risk neutral, then a zero real rate would be the only rate to be applied to the benchmark stock of assets. In such a case, alternative (1) would represent the one and only adjustment necessary to allow full evaluation of performance.

Should shareholders be risk neutral, and if the real risk-free rate for the period is non-zero, then determination of the real risk-free rate for the period will be necessary. As actual performance is to be compared against an *ex ante* target defined in terms of start of period expectations, the hurdle rate for alternative (3) should be the real risk-free rate in the economy as at the beginning of the accounting period, for the term equal to the accounting period. A recent development in the type of financial instruments on offer in the UK has been the index-linked stock issued by the government. The observable yield on these bonds can be considered risk-free, and defined in real terms. However, the issues made so far have not been short-dated and the yields span the term from 5 to 25 years. Future development may see such instruments on offer for the short terms appropriate to accounting periods. Until that happens, reliance can be made on the nominal risk-free rates of return observable in the economy for the length of the accounting period, adjusted for the expected rate of change of prices.¹² Because of the un-

¹²Given observation of *ex ante* nominal yields for the term equal to the accounting period, i , and an estimate of the expected rate of change of prices, p , over the accounting period then *ex ante* real rates, r , are simply given by:

$$\frac{1+i}{1+p} = 1+r.$$

observable nature of the latter variable, this can only be a second best procedure. Authoritative and reliable estimates of the expected rate of change of prices are, however, available from governmental, academic and private sector economic forecasts. Similarly, a choice of suitable nominal short term risk-free yields are available from the observation of (in the UK) either the treasury bill rate (periods up to 3 months), inter-bank rate (for periods up to one year) or the yield on the one year variable rate treasury stock which has recently been issued by the UK government. Determination of the real risk-free hurdle rate for the accounting period as at the beginning of the period, will be given by the difference between the selected risk-free nominal rate for the period, and the expected rate of change of prices over the accounting period (as in footnote 12).

However, if shareholders are risk averse, as is most likely, then alternative (5)—the application of a risk-adjusted real rate of return—will be necessary. This alternative involves determination of the shareholders' *ex ante* required rate of return on equity for the accounting period. An estimate of the expected rate of change of prices for the period will also be required to establish the real rate of return required by shareholders. Shareholders' required rates of return are not directly observable and their estimation involves reliance on equity share valuation models. As no general agreement exists to allow a non-controversial choice to be made,¹³ it may be considered in practice that the next best alternative, i.e. 3—the use of a real risk free rate—should be adopted to provide a lower bound target income figure.

Difficulties about the selection of an appropriate target rate for the period are one of a number which serve to make the evaluation by investors of management, based on excess current income, a partial affair. Recall that target income is determined *ex ante* based on aggregate CoVA at the start of the period and the *ex ante* anticipated target rate of return. Excess current income, arising as the difference between income *ex post* and target income, therefore includes not only anticipated returns on opening CoVA plus those on the unobservable asset—subjective goodwill—but also reflects the results of unanticipated or windfall events. Because of the subjective nature of the expectations that management hold it is not possible to classify *ex post* income into its anticipated and unanticipated components so as to allow a full scale appreciation of the events occurring over the

accounting period. Thus, basing target income on an asset benchmark which partly reflects managerial expectations is looked upon here as constituting some advance in the evaluation of performance. However, because of the subjectivity of the remaining factors, forming a view of excess current income must necessarily remain a matter of opinion depending upon the *ex ante* views held by the individual user of accounts.

The views of an individual user of accounts about adequacy of performance are likely to be clarified a good deal if management are required to provide a detailed analysis of the reasons which in their opinion reconcile the difference between target income and actual income arising. At present, management's review of operations where provided, or the report of the directors, lacks any framework against which managerial performance might be objectively appraised. CoVA, together with excess current income, provide a means by which this deficiency might be remedied.

Finally, the role of the auditors *vis-à-vis* the monitoring procedure ought to be recalled. Beyond the verification of the asset values on which target income and actual income are based, the contribution of auditors to the evaluation procedure must be limited. As theories about required rates of return evolve into practical applications, the auditor might be expected to comment on managements' choice of the *ex ante* target rate of return. It is possible to envisage that eventually identification of excess current income might be integrated with data on inter-industry and inter-firm comparisons to allow auditors scope to comment on managerial performance.

Operation of the monitoring procedure

Determination of the hurdle and excess income figures can easily be demonstrated. Consider a firm which during the accounting period neither paid dividends nor received any capital from its shareholders. Let A_0 and A_1 be start of period and end of period net assets, valued in accordance with CoVA; where r_1 is the *ex ante* real risk-free rate for the period (assuming alternative (3) is adopted); p_1 is the anticipated rate of change of prices in general; y_1 is actual income; t_1 is target income and e_1 equals excess current income. Then:

$$y_1 = A_1 - A_0(1 + p_1)$$

$$t_1 = A_0(1 + p_1)r_1$$

and

$$e_1 = y_1 - t_1.$$

As an aid to monitoring over time it will be necessary to account for any shortfalls of actual

¹³One possible solution for quoted firms, in determining the shareholders' risk-adjusted required rate of return would be to adopt the CAPM, and rely on the β estimate to determine the proportion of the excess return to the market which should be added to or subtracted from the risk-free rate of return.

income against hurdle income. It may well be the case that management, in deciding to hold assets and continue activity, do so rationally even where it is anticipated that an intermediate shortfall in return will arise. Provided subsequent returns are high enough to compensate for the shortfall, and/or transaction costs do not allow profitable intermediate selling and subsequent reacquisition of asset services, then such a strategy can be optimal. Therefore, in order to accommodate such an allowable possibility and to improve the monitoring over time, a supplementary account ought to be set up. For any accounting period, actual income arising, y_1 , ought to be credited. Target income, t_1 , will be debited. Any shortfall, $y_1 - t_1 = -e_1$, should then be carried forward to the succeeding period, suitably compounded at the nominal *ex ante* risk-free rate, giving $-e(1 + p_2)(1 + r_2)$, and debited to the account. Target income $A_1(1 + p_2)r_2$ will then be debited and so on. Should an excess of actual income over target income arise, as ought to be the case considering that the components of target income are both minima, then the resulting surplus is not carried forward but ruled off, and left for shareholders to appraise the adequacy of the excess against their expectations. However, it is possible, particularly in the extraction industries, that over the life of a worthwhile investment opportunity, expenditure will be necessary which will depress returns below the minima required. A solution in these circumstances might be for the company chairman, in his report to the shareholders, to indicate *ex ante*, the expected timing and size of these shortfalls and also when they arise, to identify their extent and impact on the figures reported to the shareholders.

Implications of the preceding analysis

1. In the paper, emphasis is placed on the use of management accounting data and management accounting techniques as the basis for choosing between RC and NRV in pricing asset services for financial accounting purposes. This appears to have two implications for accounting education and research. Greater reliance on market determined prices (where these are available) would allow less attention to be paid to the often arbitrary accruals procedures which underlie conventional financial accounting. On the other hand, more attention ought to be devoted to efforts seeking to evolve improved managerial decision making techniques, in particular those dealing with the treatment of uncertainty.

2. Adoption of the proposed method of accounting can be considered beneficial to the auditing profession for two reasons. Firstly, the removal of the need to account for goodwill and the greater

opportunity to rely on objective market prices, where these are available, ought substantially to improve the independence of the auditors. Secondly, the method devised provides the means whereby auditors might be able to improve the service they offer to their clients—the shareholders. At present in West Germany, auditors of the largest companies include in their audit report a section analysing the results of the firm's activities.¹⁴ However, their ability effectively to fulfil this task is likely to be hampered by the legalistic framework within which West German financial accounts are drawn up. If the results of applying the present method were available, then auditors wishing to satisfy any client demand to assess managerial productivity might be better equipped to do so.

3. The nationalised industries represent an area of particular interest where evaluation of managerial performance has traditionally proved difficult but which is, from a public interest point of view, a matter of some importance. The notion of management being charged with the control of assets and the related responsibility to earn required returns on them may encourage either (i) payment of proper subsidies from government for non-economic activities which they are obliged to undertake, or (ii) segmental reporting of the results of these activities. As the public represent the owners, providing loan finance and/or Public Dividend Capital, the 'entity' rather than the equity view in financial accounting will be appropriate. The target income figure would then be compared against enterprise earnings before any charge is made for interest on loan capital.

4. A final implication, possibly the most important and certainly the most nebulous, is the beneficial effect the proposed method of accounting might have on the efficiency with which the affairs of large enterprises are conducted. Shareholders and good managers have an interest in the introduction of a system which will better identify the superior productivity of the latter. The monitoring technique provides an objective target for company profitability which management ought to be able to attain. Management can then account for the differences arising between actual performance and the target income figure. On the basis of the analysis provided by management, shareholders ought to be able to arrive at a more informed opinion on the quality of their managers than would be possible were CoVA and the excess current income technique not adopted. Better quality monitoring in turn can make possible the drawing-up of improved contracts for managerial

¹⁴For an account of the operation of West German company law as laid down in the *Aktiengesetz* as it applies to auditors' responsibilities and financial accounting requirements, see Beeny (1976).

remuneration to ensure that management are encouraged to work in the shareholders' best interests.

Conclusions

The method of accounting developed in this paper is based on ideas borrowed from a principal-agent framework of analysis, and on a strict separation of the purposes viewed as being served by management accounting and by financial accounting. The latter acts as the means by which outsiders (shareholders in widely held corporations and the public in the case of nationalised industries) can monitor the performance of management. This is in contrast to the Edwards and Bell view that the results reported in financial accounts form the basis on which management take future resource allocation decisions. The main characteristic of the method is the notion of management contracting to earn at least the shareholders' required return on the net assets of the firm for which they have bid. Accountants, as preparers and as auditors, are not considered to have any competence in establishing the values (in the proper *ex ante* sense) of the assets of a going concern. Accordingly, the eclectic valuation concept of 'value to the firm' is held to have no role in financial accounting given difficulties in its application associated with subjective values. Management are thus constrained to bid either NRV or RC for the assets they choose to retain for use in the business.

The method by which management's performance might be appraised is similar to that provided by the application of the technique developed by Edwards and Bell to determine excess current income. A form of supplementary accounting was suggested to allow improved monitoring of managerial performance over time, given the resources that management have decided to hold, the prices they have bid for these and the selection of an appropriate hurdle rate of return. No claim is made that the advocated monitoring procedure rules out the need for judgement by the users of accounts in arriving at an opinion on managerial performance. What is claimed is that the reporting of CoVA values by management might lead to investors' obtaining an improved insight into managerial expectations. Further, the provision of a framework identifying the extent to which *ex post* income departs from target income provides management with an opportunity to report more effectively to investors the results of the accounting period. Managerial analysis of affairs may then in turn allow investors to form clearer views about managerial competence and the likely value of the firm. To the extent that these aims are achieved, the accounting proposals advocated in this paper will have contributed toward improving the efficiency with which resources are allocated.

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Improving the Communication Function of Published Accounting Statements

Malcolm Smith and Richard Taffler

Introduction

Developments in external reporting over the last few years have been more concerned with content than the problems of language and presentation of published financial statements. In this paper we recognise the importance of presentation as well as content in the effective communication of accounting information, and explore the potential value of facial representations in the communication of the multivariate data set provided in the published accounts.¹ Prompted by the wealth of psychological literature which suggests that the facial form might provide a means of perceiving multivariate data as a Gestalt, computer-based methods of construction have been employed to describe the simultaneous effect of many accounting variables. The resulting format can be processed intuitively to detect company trends over time, identify salient performance characteristics and generally identify groups and outliers. Section I discusses the complexity of the existing accounting information set whilst Section II reviews the use of visual methods in the communication of financial data in general and the nature and potential advantages of facial representations, or 'pictics', in particular. Section III provides an example of such an approach in the measurement and detection of trends in company performance and Section IV illustrates the potential benefits of its use as a screening device, using the company bankruptcy example. The paper is concluded in Section V with a restatement and summary of the arguments presented and an explicit call for more research to help improve the communication of financial information in the published accounts.

I The complexity of financial information

Information overload is a phenomenon that has

been addressed frequently in the cognitive psychological literature. Schroder *et al.* (1967) have demonstrated that an increase in the quantity of information beyond a certain point may result in a lowering of our ability to make judgements, since mental resources previously committed to the perception of stimuli are now devoted to their integration. In the financial field, research by Casey (1980) has shown decision making performance to be impaired by heavy data loads. His work with bank loan officers confirmed negative returns from additional financial information because of data assimilation time and the lack of improved predictive accuracy.² If we accept the need for data expansion, then, in the absence of user education, the mere provision of additional accounting information is not enough. Information that is not understood is neither communicated nor useful. Focus on the problem of understandability should be redirected from the complexity of content towards the communicative ability of the means of presentation employed.

Research by Swanson (1974) and Zmud (1978) has suggested that user perception of information has four basic dimensions:

- (i) The significance, usefulness or helpfulness of the information;
- (ii) The accuracy, factualness and timeliness of the information;
- (iii) The quality of format and readability of the information;
- (iv) The meaningfulness or reasonableness of the information.

A factor analysis of the same data set by Larcker and Vessig (1980) yielded two distinct components on to which these variables were appropriately loaded: perceived importance (a function of relevance, informativeness, meaningfulness, helpfulness and significance) and perceived usability (a function of non-ambiguity, clearness and read-

¹'Accounting numbers may be viewed as random variables. The observed values (or "realisations") of these random variables are the reported values found, for example, in published annual reports.' (Gonedes and Dopuch, 1979, p. 386)

²A detailed description of other studies in the accounting and finance environment is provided by Libby (1981).

ability). Such findings focus perceived usefulness on two distinct dimensions: the content and the presentation of the information. Effective communication requires that attention be devoted to both of these factors.

The combination of complex language with a potentially confusing format and widespread footnotes would appear to have the effect of restricting the communication of accounting information, reducing both its readability and comprehension. The findings of Lee and Tweedie (1977) suggest that narrative disclosure is the most efficient of the alternative formats currently employed in corporate reports, but they note that even the most widely read section, the chairman's report, is not as widely read as second-hand financial press reports.

The apparent inability of the corporate report in its present form either to attract or to maintain the interest of many of its potential users highlights the problems faced by the preparers of accounts in attempting to communicate financial information to a largely unsophisticated audience. Nor are simplified accounts the answer, since as Hammill (1979) notes, these too focus on content rather than on presentation. In the absence of extensive user education, more research into the improvement of communication in financial reporting is called for.³

II Visual methods of representation

The search for an enhanced means of reporting focuses naturally on the use of visual methods for representing relationships, making them both easier to grasp and retain. Numerical and narrative exposition appears to be employed frequently in published financial statements when pictorial methods might be more appropriate. When used, such methods are normally confined to variations on the familiar theme of graphs, charts and trend lines. Alternative and potentially more rewarding means of communicating multivariate information remain largely unused. Jensen (1976) is enthusiastic about the advantages of different kinds of visual display in the communication of accounting information:

An advantage of visual display is the tremendous ability and flexibility of humans for detecting spatially and temporally distributed features in the data. Mathematical models, though an aid in discovering relationships, have much less flexibility and adaptive innovation ability.

Lothian (1976) recognises that:

more research is required to establish the poten-

tial value of reports presented to users in different styles. The novelty of such notions may be exceeded only by their effectiveness in communicating with users of financial statements.

Alternative methods of presentation, notably those involving the use of a facial format, may seem a little strange to existing users, but the test of their usefulness will be in the successful communication of financial messages.

Traditional graphic forms have not been entirely satisfactory in their representation of accounting information. Existing graphs and charts are limited to describing the relationship between very few, usually two, variables, whereas financial data are both complex and multidimensional. If a complete picture is to emerge, rather than a series of isolated relationships, additional graphical methods are required which will adequately represent the multivariate nature of the data.

The impact of graphical representation is an important attribute since a forceful picture must be produced which allows new stimuli from a complex data set to be perceived while existing stimuli are being integrated. While demanding attention, such figures should also be clear enough to make interpretation possible without a detailed explanation. Chernoff (1973) has initiated the use of computer-produced schematic faces known as 'pictics', whose features can be made to vary in size and shape according to the values of an appropriate set of variables, up to 20 of which can be represented simultaneously.⁴ These have the advantage of providing figures whose effect may be more than just the sum of the individual variables.

Whereas standard graphical means will prove quite satisfactory when the data have only two dimensions, or can meaningfully be reduced to two dimensions, the handling of higher degrees of dimensionality is eased when the figure can be perceived as a single whole. Faces have just this characteristic, as well as the advantage of providing a format which is particularly sensitive to the detection of small variations.⁵ The complexity and familiarity of faces makes them a special class of

⁴Frith in Everitt (1978) and Flury and Riedwyl (1981) have produced more realistic cartoon faces along similar lines, with facial differences which are more subtle since they give greater emphasis to facial outline, hairline and chin curve. Although McDonald and Ayers (1978) suggest that facial outline plays an important role in visual clustering, preliminary comparisons of the Chernoff and cartoon faces show differences in facial outline more difficult to detect than changes in the shape and size of features like the eyes and the mouth, especially for inexperienced users. Whereas the meaning of the smiling faces and frowned eyebrows of the Chernoff face is readily apparent, the recognition of consistently meaningful expressions is more difficult in the cartoon face where changes with respect to, say, chin curve, have no universally acceptable implications.

⁵Kleiner and Hartigan (1981) provide a discussion of the relative merits of alternative pictorial methods in the representation of multivariate data.

³The need for further work in this area has recently been acknowledged by the Technical and Research Committee of the ICAEW in their 'Programme for Research' (1982) paragraph 9.4.

visual input. Their ease of recognition and description makes them superior to other pictorial forms of representation, and experiments by Jacob (1978) and Yin (1969) have shown that faces consistently outperform other visual stimuli in the highlighting of differences. The importance of the face as a source of visual stimuli derives from developmental changes in infants, whereby they quickly learn to respond to more differentiated forms. With increasing age the overriding importance of the eyes as a source of recognition and attraction is complemented by increasing attention to other facial features, facilitating the differentiation between various expressions.⁶ The similar reaction of infants to real faces, photographic representations and schematic line drawings, forms the basis of their reaction as adults to the messages provided by cartoon faces. The possibility exists that, with appropriate assignments, the facial format might be employed to communicate information on the magnitude and change in a number of variables simultaneously without the need for detailed explanation or education of users. Following Chernoff's (1973) pioneering work with fossil data and geological specimens, studies in various fields in the USA using the Chernoff program have suggested further possible applications for schematic faces. These range from foreign policy studies through to the identification of forged Swiss banknotes and even the prediction of the results of American football games!⁷

Of more immediate interest here is the US based work of Moriarity (1979) with financial statement data, in which he examines the use of multidimensional graphics as a technique for describing the financial status of a firm. He suggests that unsupported faces may provide an excellent framework for decision-making when produced as an alternative to information conveyed in more traditional fashion. Moriarity asked respondents to classify 22 retail companies as bankrupt or non-bankrupt, without knowledge of prior probabilities, when presented with appropriate financial information in each of four alternative formats:

- (i) schematic faces with no explanation of the assignment of financial variables to facial features;

- (ii) schematic faces with a brief explanation of the representations;
- (iii) selected key Dun and Bradstreet business ratios relating to each of the companies, together with, in each case, an indication of industry averages for a six-year period;
- (iv) the actual financial statement balances required to calculate the ratios.

Each of the alternative forms reflected the same changes in the financial statement information but Moriarity's respondents found the changes most easily detected in the faces. 'Faces without explanation' were classified faster and more accurately than either the raw accounting numbers or the derived ratios by both accounting students and practising accountants. In addition, errors of classification were significantly higher for both students and accounting professionals for data presented in a ratio format, which was attributed to a lack of understanding of what the ratios really represented.⁸ Moriarity also claimed that his schematic faces outperformed Altman's 1968 Z-model (1968) for the discrimination between bankrupt and solvent companies.⁹ Libby (1981) suggests that the use of such multidimensional graphics in the audit environment might facilitate auditor detection of inconsistencies during routine analytic reviews.

Empirical evidence on the detection of facial cues and the interpretation of faces suggest that the assignment of appropriate variables to facial components is important. Most practical studies have involved the random assignment of variables to facial features and have paid insufficient attention to the relevant psychological literature on feature saliency. Chernoff and Rizvi (1975) have shown that 'random permutation in the assignment of facial parameters may affect the error rate in a classification task using these faces by a factor of about 25 per cent.' Accordingly, examples in this paper attempt to match those facial features identified by the psychological literature as being of greatest importance with variables highlighted by a factor analysis of accounting statement information in the form of financial ratios.

The implications for the processing of facial information are that the single image representing multidimensional data is an entity in which the whole is worth more than merely the sum of the parts, just as the overall informational content of a set of accounts is greater than the sum of its

⁶'With increasing maturity the child comes to attend to features other than the eyes; his information-processing apparatus ceases to handle only those stimuli to which it is innately linked and takes account of their context as well'. (Schaffer, 1971, p. 69)

⁷Wang (1978) contains a number of different studies, as does Flury and Riedwyl (1981). Everitt (1978) has provided illustrations of the way in which Frith's cartoon faces might be used for clustering, and these have recently been employed by Hodd and Dunsire (1981) to represent the budgets and expenditure policies of different government departments in the UK.

⁸A recent survey conducted by Lee and Tweedie (1981) tends to confirm this view, surprisingly suggesting that financial experts have a less than clear understanding of the meaning of some of the most familiar financial ratios.

⁹It should be pointed out, however, that Altman's model was derived from small manufacturing companies, and erroneously applied by Moriarity to a sample of large retail firms.

Table 1
Financial Ratios and Dimensions Represented

<i>Ratio</i>	<i>Representing Dimension of Accounting Information</i>
<u>Earnings before Interest and Tax (EBIT)</u>	Profitability
<u>Average Total Assets (ATA)</u>	
<u>Total Liabilities (TL)</u>	Financial Leverage
<u>Total Net Worth (TNW)</u>	
<u>Working Capital (WC)</u>	Working Capital
<u>Net Capital Employed (NCE)</u>	Position
<u>Quick Assets (QA)</u>	Liquidity
<u>Current Liabilities (CL)</u>	
<u>Average Current Assets (ACA)</u>	Asset Turnover
<u>Sales (S)</u>	
<u>Value Added (VA)</u>	Value Added
<u>Average Total Assets (ATA)</u>	

constituent elements.¹⁰ A further advantage lies in the fact that the facial representation may not be restricted only to identifying change, but may also communicate the effect through changes in expression in a manner impossible for other pictorial methods. Despite the subjective nature of the response to faces, a marked degree of consistency has been noted across groups of individuals. Cüceloglu (1970) and Ekman *et al.* (1972), for example, found similar facial expressions to be associated with the same emotions, regardless of cultural or language differences. The relative importance of particular facial features in determining the overall impression created seems to depend on the particular emotion being displayed as well as the dimensionality of the data. Studies seem to show 'up-turned mouth' to be the most important feature showing well-being, while a combination of 'down-turned mouth' with 'eyebrow-slant' best portrays an unsatisfactory state of affairs. The Chernoff program recognises the particular importance of the eyes and mouth in creating impressions and gives explicit emphasis to these features in a schematic representation.

To illustrate the potential benefits for the financial analyst from the use of schematic faces, two examples are provided:

- (i) the detection of change in performance over time, in which the faces act as gauges measuring financial position, facilitating the detection of abnormal performance and highlighting areas for action, and

- (ii) as a screening device to facilitate the examination of large amounts of financial information and allow the classification of observations. Here the bankrupt/solvent decision is employed.

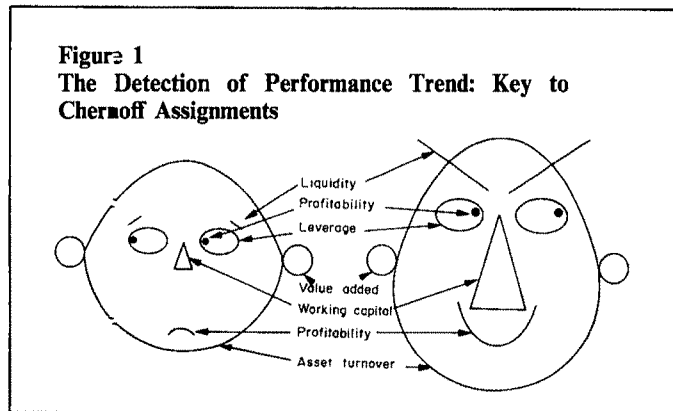
Like those of Moriarity, the preliminary results presented suggested that the facial format may have a useful part to play in the detection, control and communication of financial performance, and justify the need for more research.

III The detection of trend in company financial performance

Taffler and Sudarsanam (1980) applied factor analysis to identify the underlying dimensionality within a set of 80 financial ratios calculated for 547 manufacturing companies. Six ratios, loaded on independent factors, were selected for the purposes of further analysis. These are listed in Table 1. Taffler and Sudarsanam argue that performance in any year is a relative, not an absolute, concept, and emphasise the importance of using a ranked position measure compared to other companies rather than the more conventional raw ratio approach. In this way first order effects of changes in the economic environment may be removed, allowing valid inter-temporal comparisons.

To illustrate the manner in which inter-temporal performance comparison may be made using 'pictics', two deteriorating companies, Dunbee-Combex-Marx (receivership) and EMI (merger), are considered along with two relatively stable ones, GEC and ICI. For each concern the financial ratios of table 1 were first calculated for the years 1974 to 1979 and these converted into percentile scores to reflect relative company performance on

¹⁰Interpretation problems may, however, potentially arise because of the overriding prominence of one or two facial characteristics. Nonetheless, similar problems can also arise in financial analysis from an overemphasis on an individual accounting variable, such as the profit number.



each measure, in each year separately, compared to manufacturing industry as a whole.¹¹

The resulting variables are assigned to particular features of the face, being transformed as necessary so that 'better than average' performance was matched with a pleasant facial appearance.

Figure 1 indicates the assignment of variables to facial features that is used to match those variables highlighted by the factor analysis with the most prominent facial features.¹² This figure also illustrates the way in which changes in the variable values can produce extremes in the overall Chernoff portrait. In this way a visual impression of the personality of each company is created which may even allow some speculation as to its corporate identity and attributes.¹³ A healthy, profitable and secure company might be expected to have a round smiling face with large, bright, forward-looking eyes, while a company in financial distress might wear a worried frown on a long face, with low-slung, down-turned mouth. The eyes would be small and close together, exhibiting furtive backward-looking glances. The addition of a small pinched nose might also add to the overall message by creating the impression of the empty, washed-out face of an impoverished enterprise. Figure 2 shows the resulting trend in relative performance for the four companies using the Chernoff program, and facilitates the detection of change over the time period considered.

Dunbee-Combex-Marx

The reversal of fortunes in the last year is startling, although balance sheet weakness was

already apparent in the two previous years. A happy, smiling, bright-eyed face is transformed into one in which ear-level has fallen, mouth curvature reversed, mouth length reduced and direction of gaze reversed, all because of falling profitability compounding balance sheet difficulties. The reduction in eye size reflects increased financial leverage while the reduced size of nose shows a deteriorating working capital position.

EMI

The eyes remain tiny over the whole period, reflecting a relatively poor leverage position, and the nose is similarly small, reflecting poor working capital. But the major reversal takes place over the final two years when the smiling face changes to one with backward-looking eyes, low-slung ears and a low, small, down-turned mouth, illustrating the decline in profitability and value added performance.

ICI

The trend over time indicates a stable performance with varying levels of relative profitability. The large eyes, large nose and high angled brows are all consistent with balance sheet strength and sound liquidity, working capital and leverage positions.

GEC

A sound and consistently profitable performance is apparent from a smiling face in which nose size has increased, reflecting an improved working capital position, and the only deterioration within the period relates to the reducing eye size following increased financial leverage.

Overall, the faces can be seen to reflect changes in ratio performance in a manner likely to ease the detection of change and to facilitate the interpretation of such changes.

¹¹The reader is referred to the original source article for a fuller description of the approach.

¹²The version of the Chernoff program used is provided in Bruckner (1978, pp. 115-120). The ratios and associated percentile scores for each company are available from the authors, together with further details of the variable assignments to facial features.

¹³This visual representation of performance, based on accounting numbers, complements the idea of 'corporate personality' developed in a numerical sense by Sorter *et al.* (1966).

Table 2
Financial Ratios and Dimensions Represented in Linear Discriminant Model

<i>Ratio</i>	<i>Representing Dimension of Accounting Information</i>
Profit Before Tax (PBT)	Profitability
Current Liabilities (CL)	
Current Assets (CA)	Working Capital Position
Total Liabilities (TL)	
Current Liabilities (CL)	Financial Leverage
Total Assets (TA)	
No Credit Interval (days)	Liquidity

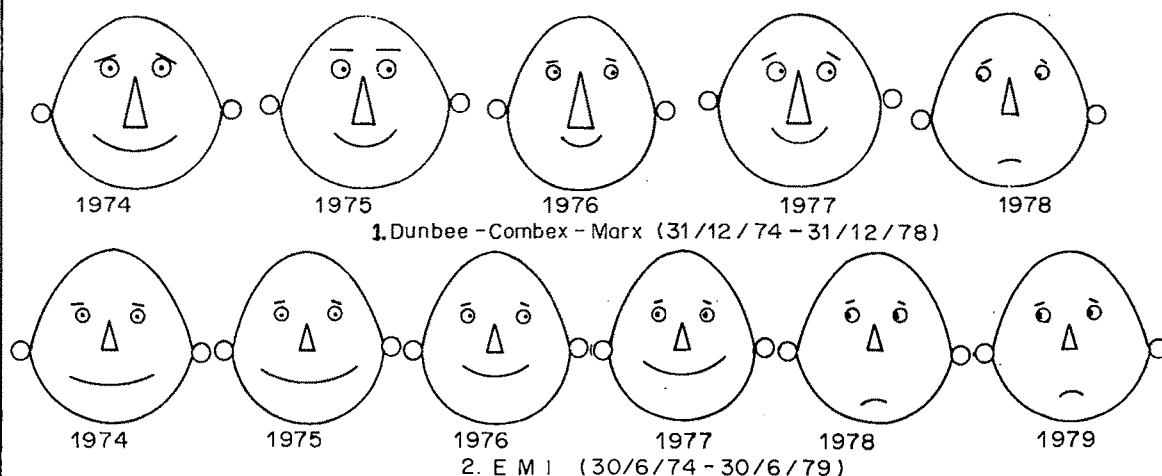
IV The classification of solvent/failed companies

Taffler and Tisshaw (1977) used a linear discriminant model with a sample of 92 companies in order

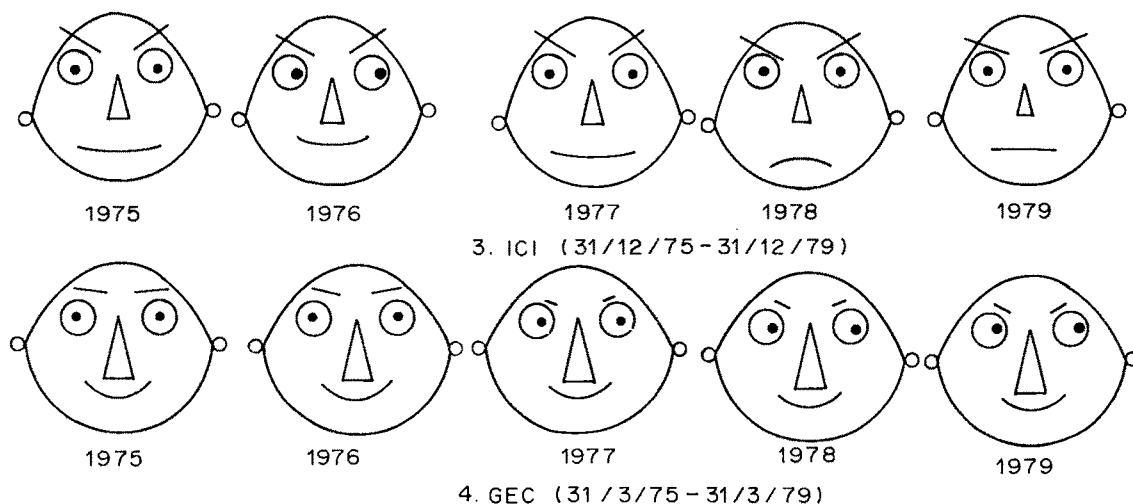
to distinguish between solvent and bankrupt manufacturing companies on the basis of their Z-scores. The constituent variables of their model are listed in Table 2.

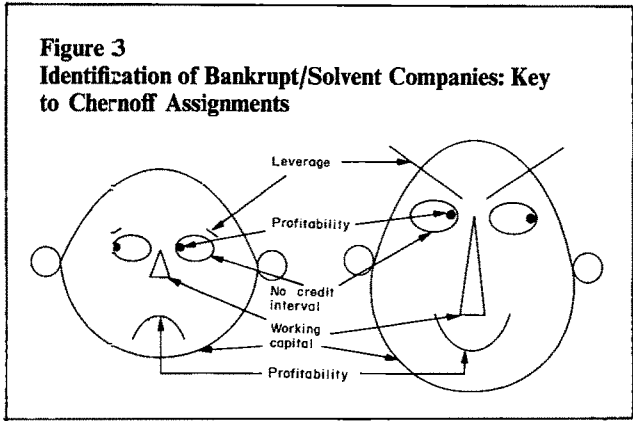
Figure 2

The Identification of Trend in Financial Performance: (a) Companies Exhibiting Financial Distress



The Identification of Trend in Financial Performance: (b) Sound Companies





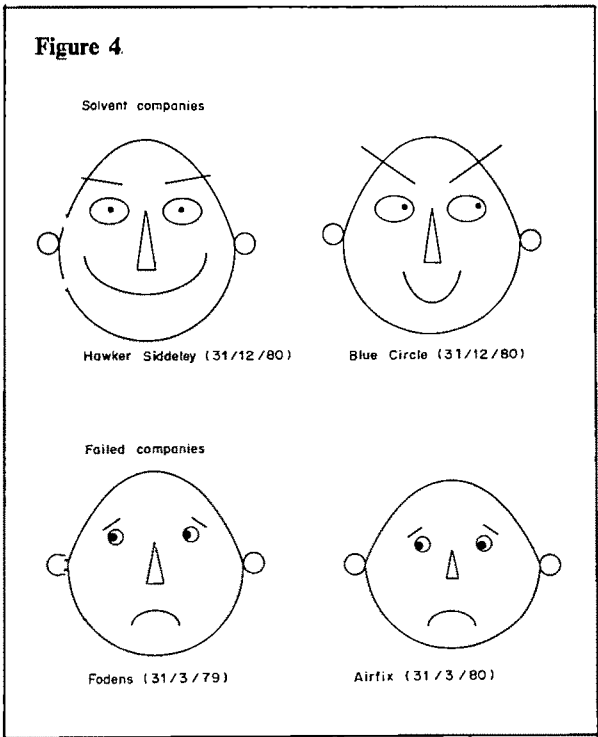
The Taffler and Tisshaw Z-model ratios were assigned to facial features in accordance with Figure 3 to provide extremes of Chernoff portraits as shown. Once again the aim was to produce faces which reflected the financial performance of the company and which could be interpreted without the need for a detailed explanation of the variables employed or the feature assignments.

Figure 4 illustrates the use of the technique by showing pictics for four companies, two solvent and two failed. Thus Hawker Siddeley and Blue Circle exhibit large smiling faces with long noses and large rightward-looking eyes, features consistent with highly profitable concerns with strong no-credit intervals and respectable working capital positions. The larger mouth of the former, however, indicates greater relative profitability, while

the larger eyes and flying eyebrows of the latter indicate a longer no-credit interval and a lower leverage figure.

The failed pair on the other hand, based on their last accounts prior to failure, exhibit a similarly forlorn appearance. Fodens and Airfix both have down-turned mouths, perplexed eyebrows and small backward-glancing eyes, indicative of extremely poor profitability, poor asset positions and weak no-credit intervals within a high-risk situation. However, Fodens provides some marginal respite in the longer face and nose of a slightly better current asset position.

These examples are interesting in that they suggest that pictics may potentially provide a clearer indication of the financial state of an enterprise than is apparent from its accounting ratios alone.



The ease of detection of facial differences appears to facilitate the distinction between failed and solvent companies within a large data set. An experimental examination, to test this hypothesis, is currently in progress.

V Conclusions

Preliminary evidence discussed here suggests that facial representations may provide a potentially useful supplementary means of communicating financial information. We may speculate on their usefulness in highlighting possible financial problem areas, in the detection of audit inconsistencies, in stock market analysis and even in the teaching of the interpretation of accounts to students.

At the very least, the technique may have value in the scanning of large numbers of observations in order to detect extreme values. It might ease the task of bank loan officers in assessing credit-worthiness by clearly distinguishing those cases which are acceptable/unacceptable and those which require more detailed examination. Similarly, the provision of facial expressions allows the detection of multivariate trends over time in a manner which is apparently difficult using numerical or conventional graphical expositions.

Researchers have devoted very little attention to the question of data presentation in a financial environment. To date more emphasis has been placed on the accuracy and content of accounting statements. Despite the unconventional nature of the form of visual representation discussed here, it highlights the possible relationships that may exist between the predictive ability of a data set and its method of presentation. A novel and humorous approach to data representation can certainly be defended if more accurate and effective decisions result.

Further research in this area may well be justified in an attempt to improve the communicative ability of published financial statements.

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Another Look at the Levels of Assurance Issue in Auditing

Anthony Steele*

Introduction

In a recent article,¹ J. Y. Lee addresses the problem of quantifying the degree of credibility which the auditor is trying to communicate when expressing an opinion on a set of financial statements. He develops a model in which credibility is given in terms of 'total levels of assurance', T . T is a continuous scalar, which Lee believes is the first step to specifying degrees of credibility for auditors' opinions.

However, in the present article it is argued that, although the model that Lee develops provides some useful insights and focuses on difficult areas of measurement in the audit process, a key component of the model, the concept 'total level of assurance', is not only undefined but is incapable of being defined other than tautologically. Furthermore the particular method Lee illustrates for constructing this 'total level of assurance' has some unfortunate logical properties. This paper first discusses what precisely might be meant by the terms 'credibility' and 'assurance', and then suggests an adjustment to Lee's model which sidesteps the semantic conundrum. The conclusion is that it may be more fruitful conceptually to view the audit process as giving rise to a vector of beliefs, rather than an overall scalar aggregate total level of assurance.

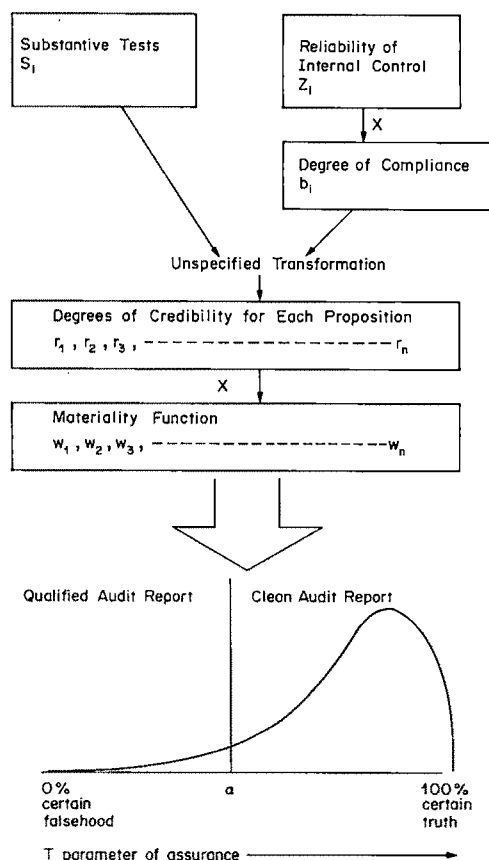
J. Y. Lee's theoretical framework

Lee's model can be schematically represented as in Figure 1. The total level of assurance T is seen to depend on the degrees of credibility, r_i , of the elementary propositions from which the financial statements are constructed, weighted by a materiality function, w_i . The degrees of credibility for an elementary proposition P_i are obtained by some unspecified multivariate transformation of substantive test results s_i , the reliability of the internal control system Z_i and the degree of compliance b_i

(presumably from the results of compliance tests). The cut-off point α between the nominal classifications, 'a clean audit report' and 'a qualified audit report', although not discussed by Lee, would presumably be given by break-even considerations of the loss functions associated with the action choices.² Clearly Lee's objective in arguing for a quantification of 'level of assurance' is to permit a finer classification of audit opinions than current dichotomous practice. His model is of

²For an elaboration of this point see: W. R. Kinney, 'Decision Theory of Internal Control System Design/Compliance and Substantive Tests', *Journal of Accounting Research*, September 1975, pp. 15-29.

Figure 1
Lee's level of assurance model



*I am indebted to Ken Peasnell and Edward Stamp for helpful comments during the preparation of this paper.

¹J. Y. Lee, 'A New Approach to the Levels of Assurance Issue in Auditing', *Accounting and Business Research*, Winter 1981, p. 35.

particular interest for its holistic approach, viewing the fundamental propositions as inter-connected even though they arise from separate accounting systems. Furthermore, in the model, audit evidence can cause changes to the degrees of belief associated with several propositions simultaneously.

The definition of total level of assurance

The first difficulty with the model is that several expressions such as degrees of credibility, degrees of assurance, levels of assurance and thus total levels of assurance, are used when it is not clear whether these are merely synonyms for some notion of probability, or whether they are related to something more esoteric such as Shackle's³ cardinal potential surprise. On balance, it seems that a concept of probability is being employed; for instance, Lee quotes from the Committee on Basic Auditing Concepts of the American Accounting Association (1969-71):

... these varying degrees of assurance ... refers to these varying degrees of conviction as degrees of credibility—the probability that a given assertion is true or valid ...

Furthermore Lee's total level of assurance, T , does take values in the interval from zero to one which is a property of probability measures. Which amongst the various concepts of probability does Lee view total level of assurance to be? Whilst there are alternative taxonomies,⁴ and some purely axiomatic approaches to probability can be made without specifying any real world interpretation, a common distinction amongst probability concepts is drawn between objective and subjective⁵ interpretations. Objectivists view probability as a fundamental property of Nature (like mass, distance or other physical quantities). It is supposed to 'exist' and have a determined 'true' value. Estimates of 'true' objective probabilities are made by considerations of symmetry, where identical experiments repeated under identical conditions should have the same 'true' probability of success; thus statistical observation of frequencies (in the limit) gives the 'true' probability of an event. This is the probability concept of classical statisticians with their emphasis on the asymptotic results of repeated sampling. Clearly no one would argue that an auditor's opinion is an objective proba-

bility. Thus it seems appropriate to consider Lee's 'total level of assurance' as a subjectivist concept of probability. In the subjective school, probability represents 'degree of belief'. Kyburg and Smokler⁶ consider Bernoulli's 1713 treatise, *Ars Conjectandi*, to be amongst the earliest sources to define probability as the degree of confidence in a proposition of whose truth we cannot be certain. Such a view of probability marks a major philosophical divide between risk and uncertainty, and also between Bayesians and non-Bayesians.

From subjectivist probability concepts one can choose either positive or normative approaches. A positive approach is based on psychological investigations of the actual behaviour of people confronted with risk, e.g. the work reviewed by Tversky and Kahneman.⁷ Such an experimental approach, however, only yields descriptive theories, and cannot be expected to conform to the ordinary axioms of probability mathematics. Prospect Theory⁸ is a recent example of this approach.

There is perhaps a suggestion that Lee views the concept of total level of assurance to be this positive concept since in the conclusion he states:⁹

In this paper, the author has attempted to describe observed auditor 'action' within a theoretical framework ... To deal with the question of whether the model which the auditor uses is more complex than the one presented here, psychological measurement theories should be useful ...

If 'total level of assurance' is a positive psychological concept, it is neither adequately defined nor is it supported by the literature, neither does Lee offer any rationale for its properties in his model.

On the other hand, if total level of assurance is based on normative subjective probability concepts, then again there are problems with its definition. A normative subjective probability distribution over a set of events is defined by the coherent set of bets which a decision-maker is prepared to accept about those events. De Finetti remarks:¹⁰

It is a question simply of making mathematically precise the trivial and obvious idea

³G. L. S. Shackle, *Decision, Order and Time in Human Affairs* (Cambridge University Press, 1969).

⁴V. Barnett, *Comparative Statistical Inference* (John Wiley and Sons, 1975), pp. 62-89 reviews some taxonomies of probability concepts.

⁵This discussion draws largely on B. de Finetti, 'Probability: II Interpretations', in Volume 12 of *International Encyclopedia of the Social Sciences* (Macmillan Co., and The Free Press, 1968).

⁶H. E. Kyburg and H. E. Smokler (Eds.), *Studies in Subjective Probability* (Wiley, 1964), p. 8.

⁷A. Tversky and D. Kahneman, 'Judgement under Uncertainty: Heuristics and Biases', *Science*, Vol. 185, 1975, pp. 1124-34; reprinted in G. M. Kaufman and H. Thomas (eds.), *Modern Decision Analysis* (Penguin Books, 1977), pp. 39-61.

⁸D. Paul Newman, 'Prospect Theory: Implications for Information Evaluation', *Accounting, Organizations and Society*, Vol. 5, No. 2, pp. 217-230, for an exposition in the accounting context.

⁹J. Y. Lee, p. 38.

¹⁰B. de Finetti, 'Foresight: Its Logical Laws, Its Subjective Sources', *Annales de l'Institut Henri Poincaré*. Reprinted (in translation) in H. E. Kyburg and H. E. Smokler.

that the degree of probability attributed by an individual to a given event is revealed by the conditions under which he would be disposed to bet on that event.

Coherence, or zero hypothetical arbitrage profits, is imposed to ensure that the measures obtained obey the usual laws of the calculus of probability and constrain the degrees of belief only to a permissible set.

Thus a normative subjective view of probability is not a theory of the actual working of people's minds, since its subject is coherent beliefs, and people are only more or less coherent in their beliefs. Just in the same way that it cannot be said that auditors will actually think according to the axioms of logic, nor do they actually have to believe according to the laws of coherent subjective probability. Thus, if Lee's 'total level of assurance' has its roots in normative subjective probability concepts, considerably more support is required for his claim for positive status. This is a trifle of course, since there is a tradition¹¹ of normative models in auditing research in which Lee's contribution could be placed, once the difficulty of defining 'total level of assurance' in normative subjective probability terms is overcome. The real problem lies in defining the event about which T represents a degree of belief. For the elemental propositions from which T is constituted, it is possible to have degrees of belief over the values in which they can range. Not as we have seen, in the conventional statistical sense that there will be some true but unknown value, but rather in the sense that Ijiri¹² identifies when discussing 'hardness'. That is:¹³

Instead of defined . . . in terms of external reality it seems far more operational to define it by means of *consensus* among the persons who perceive the object in question . . .

So, for example, an auditor's degree of belief about the bad debt provision is not a probability distribution over an objectivist's true value of the bad debt provision, but rather the degrees of belief are over what would be the variety of figures assigned by other independent accountants to this provision. Thus one could ask an auditor for the bets he would place on the value of the bad debt provision that other accountants would arrive at faced with the same facts and measurement rules. The odds for these bets would then define the

auditor's subjective probability distribution for the value of this elemental proposition, or 'degree of credibility' as Lee calls it.

Unfortunately in converting the vector of subjective probability distributions over the elemental propositions to a single composite subjective probability distribution covering the complete set of financial statements covered by the audit report, the meaning is lost. In particular it is not at all clear what is the fundamental variable of interest over which T is defined. This author is surely not alone in concluding that the concept 'total level of assurance' is ill-defined; this is apart from any considerations of whether such a notion would be useful or desirable were it possible to define.

The composition process

Setting aside these reservations over whether 'total level of assurance' has any useful meaning, the particular method by which Lee suggests it might be constructed is now examined. Lee proposes that the 'degrees of credibility' for each elemental proposition are all multiplied together with materiality weights to form a composite measure. Thus:

$$T = \prod_{i=1}^n w_i r_i$$

where:

T = the total level of assurance; r_i = the degree of credibility for each elemental proposition $0 \leq r_i \leq 1$; w_i = weight given to each elemental proposition based on the importance of the amount involved etc. scaled so that $0 < w_i < 1$ and $\sum w_i = 1$; and n = number of elemental propositions in the financial statements and records.

Lee only offers this method for calculating 'total level of assurance' as an illustration:¹⁴

It is not contended that the multiplicative model is correct. However, it appears that many practising CPAs and academicians prefer a multiplicative model to an additive one.

This acknowledged, it is worth noting that the illustrative method displays a curious property (demonstrated in Appendix I): the total level of assurance cannot exceed n^{-n} . Thus if a set of financial statements consists of only 2 statements an auditor cannot have a total level of assurance greater than 0.25. If a set of financial statements consists of 10 statements then the total level of assurance cannot exceed one thousand millionth! For realistic financial statements, Lee's 'total level of assurance' becomes microscopically small. Perhaps the 'many practising CPAs and academicians' prefer a multiplicative model because the

¹¹For a recent review of this tradition see W. L. Felix, Jr. and W. R. Kinney, Jr., 'Research in the Auditor's Opinion Formulation Process: State of the Art', *Accounting Review*, April 1982, pp. 245-271.

¹²Y. Ijiri, *Theory of Accounting Measurement* (American Accounting Association, 1975), chapter 3, pp. 29-47.

¹³Y. Ijiri, p. 37.

¹⁴J. Y. Lee, p. 36.

more complex financial statements become, the more infinitesimal becomes their confidence in the audit opinion.

Rather than labour the point, a method of¹⁵ remedying this defect might be to define a 'relative total level of assurance', RT. RT would be expressed as a fraction of the theoretical maximum total level of assurance possible (suspending for expositional purposes the qualification that 'total level of assurance' is meaningless).

Thus:

$$RT = (n^n) \prod w_i r_i$$

This index does at least vary across the range zero to one in an intuitive way, i.e. the nearer the 'total level of assurance' is to the maximum attainable total level of assurance, the nearer the value of RT is to unity. One might argue that RT could be comparable across different financial statements in a way that T is not, since the value of RT is independent of the number of elemental propositions from which the financial statements are composed. However the numerical properties of RT are particularly unappealing since it requires calculating large numbers to large powers. Another problem that RT does not solve is the question of correlation. Due to the balance sheet identity, although a set of accounts may be prepared from n elemental propositions, only a maximum of $(n - 1)$ of these propositions can be uncorrelated. To see this, consider an example of a simple financial statement consisting of only cash, equity and liabilities. It is difficult to envisage, once one had established the cash position, how one could entertain a degree of credibility in the equity which was not directly inversely correlated with the degree of credibility in the liabilities.¹⁶ These are some of the unfortunate logical properties and problems involved in trying to form from the degrees of belief of the elemental propositions a composite measure in the manner Lee recommends.

¹⁵As merely on algebraic problem there are an embarrassment of functional forms for a composition of w_i and r_i which are not bounded above by n^{-n} , e.g.:

$$\sum w_i r_i, \sum (w_i)^{r_i}, \left(\sum \frac{w_i}{r_i} \right)^{-1} \text{ etc.}$$

The arithmetical properties of these measures is but a small issue compared with their (lack of) semantic content.

¹⁶In a practical context 'directional testing sampling plans', where the auditor tests liabilities and income mainly for understatement, assets and expenses for overstatement, and cash and stock both ways, exploit this correlation between the elemental propositions. Monetary Unit Sampling in particular is used in this manner since the technique gives an imbalanced treatment of errors of over and understatement. For further details see: T. W. McRae, *A Study of the Application of Statistical Sampling to External Auditing* (ICAEW, 1982), pp. 239-267.

Alternative model

It is perhaps not merely unfortunate that Lee's 'total level of assurance', a curious pseudo-likelihood function, has such counter-intuitive properties. Like the quest for the holy grail, the ether, phlogiston, true value, true income, etc., the notion of 'a total level of assurance' is rather ill-defined, and like the rest may be another instance of Wittgenstein's 'bewitchment of language'.¹⁷

A tentative suggestion for an alternative model of the audit opinion-forming decision might be that an auditor does not try to total his degrees of belief over the whole set of propositions in the financial accounts, but rather examines each proposition in turn, considering his degree of belief for each. If the auditor decides that his degree of belief for a particular proposition is not at a 'reasonable level' (where 'reasonable' is related to considerations of materiality) he faces the choice of returning to the testing procedures in order to 'improve' his subjective posterior beliefs; or, failing that, he issues an 'area disclaimer' qualified opinion. An example¹⁸ of such an opinion is shown in Figure 2, which might be translated as: 'We are reasonably confident that all the propositions from which these accounts are constructed meet normal standards of acceptability as currently understood, except for these propositions x, y, z , etc., which we feel do not meet these standards'. An auditor would issue a total disclaimer opinion based on the significance of his area disclaimers.

In this alternative model of the audit opinion-forming process materiality is not a vector of weights, but is viewed as partitioning the vector space of probability beliefs into an acceptable region and an unacceptable region, in a manner analogous to constraints in a linear programming problem which divide n -dimensional space into feasible and non-feasible regions. For the auditor to express a true and fair opinion on a set of financial accounts, the vector of subjective probabilities for the values over which the elemental propositions can range must fall inside the acceptable region. Under this model the final audit opinion is not a continuous scalar, but a qualitative trichotomy as follows:

- (i) *Overall True and Fair View*—The degrees of belief for all propositions from which the financial statements are constructed are inside the acceptable region.

¹⁷'Philosophy is a battle against the bewitchment of our intelligence by means of language' (109) Wittgenstein, *Philosophical Investigations*, trans G.E.M. Anscombe (2nd edition, Basil Blackwell & Mott Ltd., 1963).

¹⁸Taken from L. C. L. Skerratt (ed.), *Survey of Published Accounts 1981-82*, (The Institute of Chartered Accountants in England and Wales, 1981), p. 54.

Figure 2

An example of a qualified audit report

Whessoe Limited

27 September 1980

Report of the auditors:

To the members of Whessoe Limited

We have audited the accounts on pages... to ... in accordance with approved Auditing Standards. As indicated in note 19 the company has received a claim in respect of the Qatar contract. The extent of the liability, if any, cannot be quantified at this stage.

Because of the uncertainty of this matter, we are unable to form an opinion as to whether the accounts give a true and fair view of the state of affairs of the company and of the group at 27 September 1980 and of the loss and source and application of funds of the group for the year then ended.

In other respects the accounts, which have been prepared on the basis of accounting policies set out on pages... and ..., in our opinion comply with the companies Acts 1948 and 1967.

PEAT, MARWICK, MITCHELL & CO.

Chartered Accountants

Darlington

16 December 1980

(ii) *Area Disclaimers*—The degrees of belief for the propositions from which the financial statements are constructed are mostly inside the acceptable region, except for a few propositions subject to the disclaimer.

(iii) *Total Disclaimer*—The number and significance of the propositions that are not in the acceptable region are such that a 'true and fair view' is no longer a convenient shorthand summary for the material accuracy of the accounts.

$F[f_i(p_i)]$

$P(p_i^*)$

$M(m_i)$

where i th element of the vector is a normative subjective probability density function, $f_i(p_i)$, representing the auditor's degrees of belief for the variety of values that the particular proposition, p_i , can take.

is the vector of management's asserted point values for elemental propositions, p_i^* , to which the auditor is required to attest.

is the materiality vector whose elements, m_i , give the acceptable range of values for each proposition, p_i .

Figure 3 illustrates this alternative model. There are important features of the audit sampling and testing process carried forward from Lee's original model but unlike Lee's positive purpose '... to describe observed auditors 'action' within a theoretical framework...' (p. 35), the alternative model is clearly normative. The purpose of the alternative model is didactic,¹⁹ similar to the conceptual approach of another Lee whose auditing textbook taught 'that there is little value in knowing how to do something without also knowing why it is done'.²⁰

The three main components of the alternative model are the vectors:

Systems review, compliance testing and substantive testing

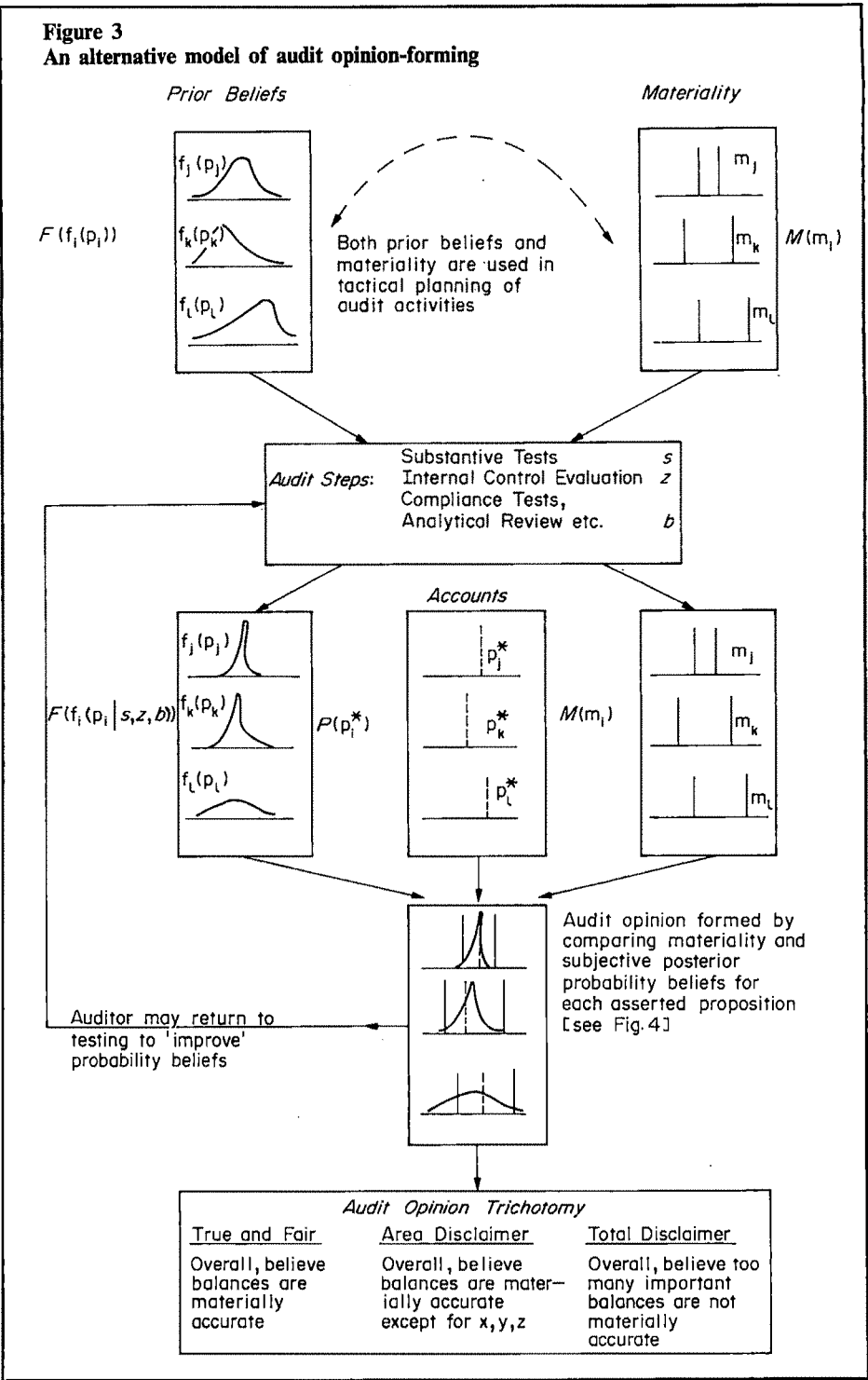
At the tactical planning stage of the audit, the relative emphasis that would be given to each proposition, p_i , or sub-sets of related propositions would be based on a comparison of F with M . Thus minimal effort might be directed at certain audit areas because the probability beliefs already fell inside the acceptable materiality range. Conversely the comparison of prior probability beliefs encoded in F with materiality levels in M might indicate sets of propositions for particular testing.

The aim of the programme of auditing testing is to change the auditor's subjective probability beliefs. As J. Y. Lee's model emphasised, audit testing is not unidimensional and the results of systems review (c), compliance testing (b) and substantive testing (s) at each stage can cause revisions to any and every element of the vector of probabilities. The elements of F become conditional (or posterior) subjective probability density

¹⁹In fairness to J. Y. Lee it should be noted that the distinction drawn between positive and normative becomes blurred in didactic models such as the one described here, particularly when appeal is made to the closeness of the assumptions to reality, rather than the closeness of the model predictions to reality.

²⁰T. A. Lee, *Company Auditing: Concepts and Practices* (Gee & Co., 1978), p. v.





functions $f_i(p_i|c, s, b)$.²¹ In this normative model the programme of audit testing on a proposition, p_i , usually ceases when the auditor's uncertainty

represented by $f_i(p_i|c, s, b)$ has been reduced to fall inside the acceptable range given by the materiality, m_i , for that proposition.

²¹In an explicitly Bayesian model, systems review, compliance and substantive testing would be viewed as data, and the posterior normative subjective probability density functions would be proportional to the prior density functions multiplied by the likelihood of the data.

Materiality

The crucial difference between Lee's model of audit opinion-forming and the alternative presented here is in the conception of materiality.

In the former case, materiality is viewed as weight function.²² In this paper, materiality is related to the concept of precision in statistical auditing,²³ as an acceptable range of values. For some propositions such as the closing cash and bank balances the auditor's range of tolerable uncertainty could be quite small, whereas for other propositions such as the value of closing stocks the range of acceptable values could be considerably wider. The determinants of the width of materiality intervals for different propositions under this conception of materiality, and why they might vary for different propositions and businesses, is a matter for further research.

True and fair view

Figure 3 shows the audit opinion as the result of comparing the vectors of beliefs $F[f_i(p_i|c, s, b)]$ with assertions $P(p_i^*)$ and materiality $M(m_i)$. In considering an individual proposition, p_i^* , there are four main cases that could arise which are illustrated in Figure 4.

Case (a)

The auditor's subjective posterior probability distribution is substantially within the materiality range of the management's assertion of the value of the particular proposition, and the auditor's mean²⁴ or best point estimate of the value of the proposition, is the same as management's asserted value, p_i^* . This case requires no special action. If all propositions are like this [or like Case (b) below] the auditor gives a 'clean' audit report, and as Stamp and Moonitz²⁵ discuss, his attestation lends credibility to the assertions of management. The tails of the probability distributions that lie outside the materiality range give the auditor's

perception of his risk of making a Type II error.²⁶ The costs of Type II errors if they are subsequently revealed are largely borne by the auditor, since he attests to a proposition which is subsequently found to be materially in error. The auditor's overall perception of the risk that he buys²⁷ in signing an audit report is a composite of the probability of Type II errors for all propositions, with the probabilities that errors will subsequently be discovered, together with the economic consequences of discovery—litigation, tarnished reputation, etc.

If auditors' risk preferences could be modelled by utility functions displaying Pratt-Arrow²⁸ decreasing absolute risk aversion, one could deduce that there would be economies of scale to auditors as insurers. In particular larger audit firms might be more efficient (economical) in their detail testing not just because they were more sophisticated than smaller audit firms, but also because as size (wealth) increases, tolerance for risk may increase. There is an interesting inference in the recent UK survey²⁹ of audit research, that some large firms of auditors are indeed willing systematically to countenance more audit risk than others.

Case (b)

The auditor's subjective posterior probability distribution is substantially within the materiality range of management's assertion of the value of a particular proposition, but the auditor's best point estimate for the proposition differs from the asserted value, p_i^* . Since the difference between the auditor's opinion and management's assertion is by definition not material, no adjustment is made and this case is treated as Case (a) above. In an auditor's file of working papers an unadjusted errors schedule would be a real world analogue of this case. However, auditors would need to be wary if too many propositions fell into Case (b) because of the problem of correlation between the propositions discussed earlier. In particular, since profit is

²²The justification for viewing materiality as a set of weights is explained by J. Y. Lee as follows: 'The basic purpose of treating materiality as a quantitative rather than qualitative concept in this paper is to pave the way to obtain a single value or range of values for the overall level of assurance in an audit'. The validity of this purpose is open to doubt as we have seen. However a recent discussion of the concept of materiality (B. T. Ro, 'An Analytical Approach to Accounting Materiality', *Journal of Business Finance and Accounting*, Autumn 1982, pp. 397-412), would lend support to Lee's view that materiality is not an all-or-nothing concept, but there exist degrees of materiality.

²³For a discussion of the relationship between materiality and precision see: A. D. Bailey, Jr., *Statistical Auditing: Review, Concepts and Problems* (Harcourt Brace Jovanovich, 1981).

²⁴Skew populations commonly arise in an auditing context, where the mean and modes are not coincident, recently discussed by Edward Blocher, 'Assessment of Prior Distributions: The Effect on Required Sample Size in Bayesian Audit Sampling', *Accounting and Business Research*, Winter, 1981 pp. 11-20. If one assumes that auditors base their decisions on expected values, then the mean is the best point estimate, although the certainty equivalent might be another possibility.

²⁵E. Stamp and M. Moonitz, *International Auditing Standards* (Prentice-Hall International, London, 1978).

²⁶The intuitive interpretation of the probability of Type II errors as

$$\left\{ 1 - \int_{m_i} [f_i(p_i|s, z, b)] \right\}$$

with a subjective concept of probability as here, should be contrasted with the less than straightforward interpretation under a classical frequentist view of probability where the probability of Type II errors would need to be described by a power curve.

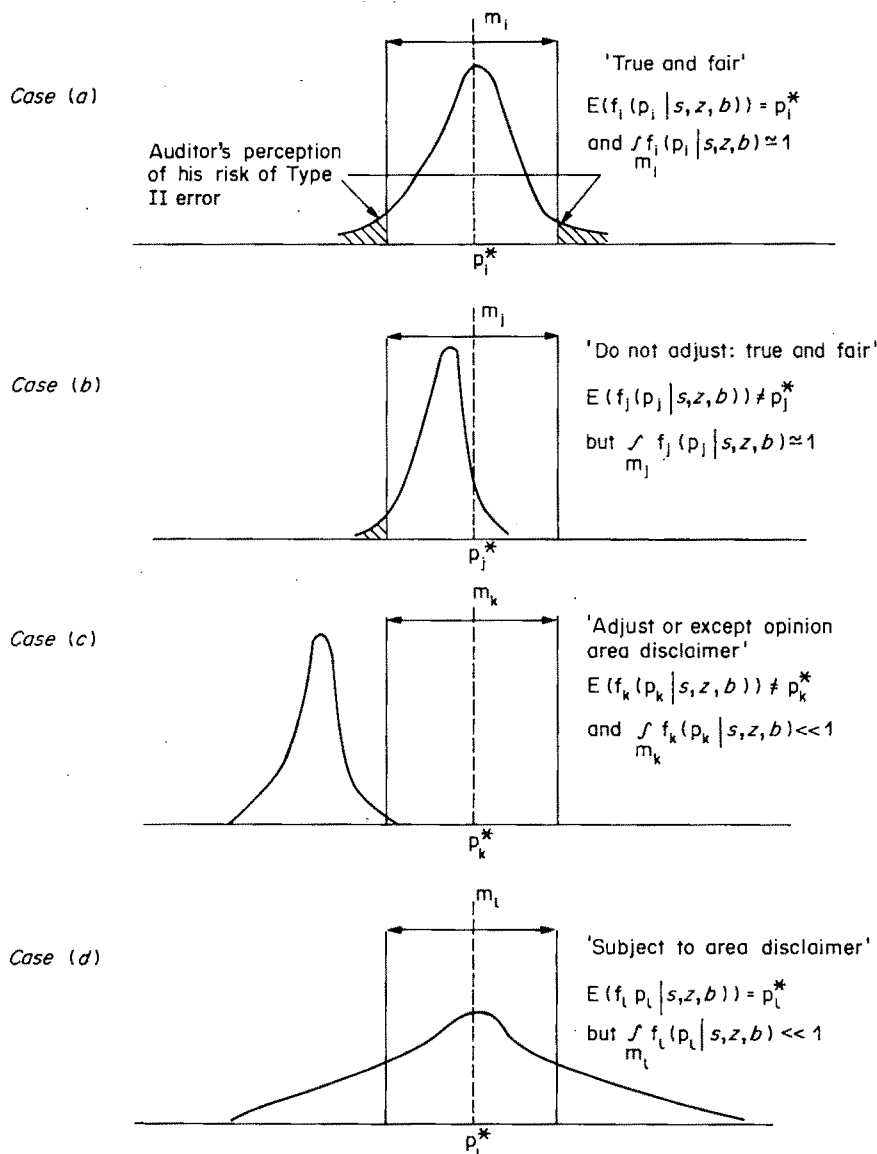
²⁷W. A. Wallace, *The Economic Role of the Audit in Free and Regulated Markets* (Touche Ross & Co., Aid to Education Program, 1980), pp. 21-22, describes a function of auditing as that of selling insurance to the financial community.

²⁸See J. W. Pratt, 'Risk Aversion in the Small and in the Large', *Econometrica*, Vol. 32, 1964, pp. 122-136.

²⁹D. Gwilliam and R. Macve, 'The View from the Top on Today's Auditing Revolution', *Accountancy*, November, 1982, pp. 116-121.

Figure 4

The four cases for the auditor in comparing materiality and subjective posterior probability beliefs for particular assertions



a residual measure ('a small difference between two large numbers'), it could arise that the cumulative effect on profit of Case (b) differences were all in one direction. Witness the Department of Trade Inspectors comments on Court Line:

We are well aware that in accounting matters a considerable degree of individual judgment is required and that it is often possible for properly held, although different opinions, to be maintained as to the correct treatment of individual items. It is, however, apparent that the Court Line Directors consistently exercised their judgment to make disclosed pre-tax profits appear as large as possible. Although we were

sympathetic to the arguments presented to us in relation to certain of the specific matters we believe that it is the overall presentation by Court Line that has to be considered in order to assess whether the published Accounts did really present a 'true and fair view' (p. 138 of their report).

These comments of the Department of Trade Inspectors suggest that the concept of overall 'true and fair view' is not just a mechanical one, simply implying that each proposition is materially accurately stated, but 'true and fair view' also requires further, that *overall* the assertion of each proposition should be unbiased.

Case (c)

The auditor's belief about a particular proposition is materially different from management's assertion. In this case if the auditor is unable to persuade management to change the assertion, the auditor issues an area disclaimer in the form of an 'except' opinion.³⁰

Case (d)

The auditor's subjective posterior probability distribution, despite exhausting the battery of audit procedures, remains too diffuse. Even though the auditor's best point estimate for the proposition may not be materially different from the asserted value (it may even be coincident) the probability of Type II error is so large that the auditor issues a 'subject to' area disclaimer³¹ on the grounds that he is unable to satisfy himself as to the material accuracy of the proposition.

Concluding remarks

Under the model of the audit opinion-forming process that has been presented here, the most

³⁰The distinction between 'subject to' and 'except' opinions is made in *Auditing Standard: Qualifications in Audit Reports* (Auditing Practices Committee, London, 1978), paragraphs 3 and 4.

³¹See footnote 30.

common alternative to a true and fair opinion is an audit report qualified by an area disclaimer. A total disclaimer opinion is given if the area disclaimer(s) are considered to be too significant. There is no overall total level of assurance which could be used to specify degrees of assurance, e.g. 'an extremely true and fair view, a moderately true and fair view, a quite true and fair view... etc.'

A home-spun analogy for this process of the auditor buying risk would be a housewife buying a pre-packed hamper of fruit and vegetables in a market. Lee's model would propose that all the fruit and vegetables in the hamper be mashed together to see how they taste (total level of quality). The alternative suggested here is that the apples, peaches, oranges, potatoes, cabbages, etc. be squeezed, one at a time, and judged against the generally (and perhaps legally) accepted particular standards of quality for that item, and a fuss be made not over the whole hamper but only over those items that both fail the test and that the housewife considers to be material. If the housewife considers that the items in the hamper that fail the test are too many and/or too important, she does not buy the hamper. Such a view of the audit opinion forming decision is, of course, only proffered *argumenti causa*, although it does circumvent those problems we have examined of trying to define and calculate an 'overall level of assurance of the financial statements taken as a whole'.

Appendix I

Demonstration that $T \leq n^{-n}$

From equation (1)

$$T = \prod_{i=1}^n w_i r_i \quad \text{where} \quad 0 < W_i < 1$$

$$0 \leq r_i \leq 1$$

$$\text{and} \quad \sum_{i=1}^n w_i = 1$$

The maximum of T , the total level of assurance, occurs when one's degree of assurance for all the individual component propositions is at the individual maxima. Thus $r_i = 1$ for all i propositions. Hence the maximum of T is given by the constrained optimisation problem:

$$\max \quad T = \prod_{i=1}^n w_i$$

$$\text{subject to} \quad \sum w_i = 1$$

$$\text{and} \quad 0 < w_i < 1$$

Forming the Lagrangean function gives $Z = \prod_{i=1}^n w_i + \lambda \left(1 - \sum_{i=1}^n w_i \right)$. Stationary values of this function occur when:

$$\frac{\partial Z}{\partial w_j} = \prod_{i \neq j}^n w_i - \lambda = 0 \quad \text{for } j = 1 \text{ to } n \dots \quad (2)$$

and

$$\frac{\partial Z}{\partial \lambda} = 1 - \sum_{i=1}^n w_i = 0$$

Since $w_i \neq 0$, equation (2) implies $w_j = w_i = w$ for all i and j .

$$\text{But } \sum_{i=1}^n w_i - 1 = 0 \quad \text{implies } w = \frac{1}{n}$$

Hence a stationary point is given by:

$$T = \left(\frac{1}{n} \right)^n$$

The second order conditions to show that this is indeed a maximum require us to examine the determinants of the bordered principal minors of the Hessian (see Chiang, *Fundamental Methods of Mathematical Economics*, 2nd Ed., McGraw-Hill, 1974, p. 388).

In this case, these have a general form for the j th principal minor of

$$(n^{-n+1})^{j+1} j n^{j-1} (-1)^j$$

accordingly they alternate in sign denoting that the stationary value is indeed a maximum.

Hence, $\max T = n^{-n}$.

Consensus Between Preparers and Users of Municipal Annual Reports: An Empirical Analysis

Walter A. Robbins

Introduction

During the last decade, American cities have been severely criticised for inadequately reporting their financial affairs. It has been asserted that local governmental units do not provide useful, understandable financial reports. Rather, the reports are voluminous documents containing confusing information of varying degrees of complexity. As a consequence of proliferating public concern regarding the limited usefulness of municipal reports and the increasing political pressure for reform, a major effort to improve municipal reporting by making it more responsive to users' information needs has begun.

In Statement of Financial Accounting Concepts (SFAC) No. 4, 'Reporting Objectives of Non-business Organizations', the Financial Accounting Standards Board (FASB) concluded that the primary objective of external financial reporting by non-business organisations is to provide information that is useful in making decisions about allocating scarce resources.¹ The National Council on Governmental Accounting (NCGA) took a similar position in Concepts Statement 1, 'Objectives of Accounting and Financial Reporting for Governmental Units', by stating that the overall goal of financial reporting by governmental units is to provide information that is relevant to users' decision models.² The underlying theme of both documents is the usefulness of information to external users' decisions.

The concept of 'decision-usefulness' emphasises the importance of users' information needs in

providing adequate financial reports.³ For instance, the FASB places decision-usefulness at the top of its Hierarchy of Accounting Qualities.⁴ Also, Accounting Principles Board (APB) Statement No. 4 indicates that users' needs and expectations should determine the type of information to be disclosed in financial reports.⁵ Based on the decision-usefulness concept, it can be argued that if municipal annual reports contain information which serves as important input into users' decision models, such reports could be considered as providing adequate disclosure. A current presumption in accounting is that preparers of financial reports are aware of the information that users require and that they attempt to make appropriate disclosure.⁶ The implication is that preparers' estimates of users' information needs form the basis of disclosure in annual reports. Consequently, it appears that the initial step in assessing the adequacy of disclosure in municipal annual reports is to evaluate the extent to which preparers perceive the information needs of external users.⁷ One method of making such an evaluation is to determine the existence of a consensus between preparers and users regarding how they value the importance of various information items.

In the public sector, few studies have empirically investigated users' information needs. As a result, little is known about users' decision models, the

³Financial Accounting Standards Board, *Statement of Financial Accounting Concepts No. 2, 'Qualitative Characteristics of Accounting Information'* (Connecticut: FASB, 1980), p. 15.

⁴*Ibid.*, p. 15.

⁵Accounting Principles Board, *Statements of the Accounting Principles Board, 'Basic Concepts and Accounting Principles Underlying Financial Statements of Business Enterprises'* (New York: AICPA, 1971), para. 43.

⁶Chandra, G., 'A Study of the Consensus on Disclosure Among Public Accountants and Security Analysis', *Accounting Review*, October 1974, pp. 733-742.

⁷This reasoning was set forth by Chandra (1974).

¹Financial Accounting Standards Board, *Statement of Financial Accounting Concepts No. 4, Objectives of Financial Reporting by Nonbusiness Organizations* (Connecticut: FASB, 1980), p. 18.

²National Council on Governmental Accounting, *Concepts Statement 1, 'Objectives of Accounting and Financial Reporting for Governmental Units'* (Chicago, IL, NCGA, 1982), p. 4.

types of information required and how preparers perceive users' needs. In 1978, Boyett and Giroux surveyed 106 major US banks in an effort to determine the types of information perceived as being important by investors and underwriters of municipal security offerings.⁸ More recently, Maschmeyer and Van Daniker (1979) attempted to evaluate users' information needs by surveying subjects from the executive and legislative branches of state government, the financial community and selected public interest groups.⁹ Subjects were asked to indicate their level of satisfaction for various aspects of state and local governmental reporting. Although these studies offer some interesting results pertaining to users' needs, they do not provide evidence relating to preparers' perceptions of what information is useful for users' decision models.

The objective of this study is to fill a void currently existing in municipal accounting literature relating to users' information needs. Specifically, this article reports the results of a study which examines the existence of a consensus between users and preparers of municipal annual reports regarding the importance of information to users' decision models. Municipal Bond Analysts (MuBAs) were selected as the primary user group, and Municipal Finance Officers (MuFOs) were selected as the preparer group.

Research design

To accomplish the stated objective, a two step survey research methodology was used. Step one consisted of developing a survey research package, while step two consisted of collecting the necessary research data. The survey research package contained a cover letter, instructions regarding the experimental task, and a questionnaire. The questionnaire development began by making an extensive review of governmental accounting and financial literature. Based on this review, a preliminary list of 70 information items believed *a priori* to be important to external users of municipal annual reports was constructed. To make the number of items more manageable, further reduction was necessary. Accordingly, 36 information items were selected from the preliminary list and included in the questionnaire. Selection of these items was based on the following two criteria:

1. The item had to be cited frequently in the literature as being important to external users of municipal annual reports.

2. The item had to represent current disclosure practice or a serious proposal to extend disclosure.¹⁰

The experimental task required MuBAs to rate each item based on how important they perceived it to be when evaluating the financial condition of a city issuing general obligation bonds. MuFOs were instructed to rate each item based on how important they believed it to be to MuBAs when evaluating the financial condition of cities issuing bonds. To facilitate the evaluation of the items, a magnitude scaling technique was used.¹¹ This procedure was desirable because it allowed subjects to differentiate more precisely between the 36 items in terms of their perceived importance.

To operationalise the magnitude scaling technique, an information item believed *a priori* to be important to external users and generally presented in municipal annual reports (i.e. the annual operating budget) was selected and used as a general point of reference. The 'annual operating budget' was set out in the questionnaire,¹² designated as the anchor item, and assigned a score of '10'. MuBAs were instructed to score the 36 remaining items in terms of their importance relative to the anchor item. For example, an analyst who believed the first item to be half as important as the annual operating budget would assign it the value of five. MuFOs were required to use the same scale.

Two hundred municipal bonds analysts and 200 municipal finance officers were randomly selected and sent questionnaires. A comprehensive, nationally based list of analysts was developed from the membership lists of professional MuBA organisations located in Chicago, New York, Boston and Atlanta. MuFOs were selected from the current *Directory: Municipal Officials in U.S. Cities*, published by the International City Management Association. Of the 400 questionnaires mailed, 77 responses were received from analysts and 84 from finance officers; a total response rate of 40%.

The data were analysed in two ways. First, to evaluate whether a consensus exists between MuFOs' perceptions of how important information items are to MuBAs and how important the items are as perceived by MuBAs, pair-wise comparisons of mean responses for each of the 36 items contained in the questionnaire were made and statistically tested at a 0.05 significance level using the t-test. The null hypothesis was that no

⁸Boyett, A. S. and G. A. Giroux, 'The Relevance of Municipal Financial Reporting to Municipal Security Decisions', *Governmental Finance*, May, 1978, pp. 29-34.

⁹Maschmeyer, R. A. and R. P. Van Daniker, 'Financial Information Needs of State and Local Officials', *Governmental Finance*, November 1979, pp. 15-19.

¹⁰The two criteria were gleaned from Benjamin, J. J. and K. G. Stanga, 'Differences in Disclosure Needs of Major Users of Financial Statements', *Accounting and Business Research*, Summer 1977, pp. 187-192.

¹¹Howard, T. P., 'Attitude Measurement: Some Further Considerations', *Accounting Review*, July 1981, pp. 613-621.

¹²The questionnaire design was based on Howard, T. P., 'On the Usefulness of Alternative Reporting Formats for Municipalities', DBA Dissertation, Arizona State University, 1978.

significant difference exists between the two sets of perceptions. Second, the 'relative' importance of items between groups was investigated. Spearman's rank correlation coefficient was calculated to measure the degree of agreement between groups regarding the rank ordering of items based on average perceived importance. The null hypothesis was that no significant relationship exists between rankings of items. The hypothesis was tested at a 0.001 significance level.

Results

A significant difference was found for 20 of the 36 pair-wise comparisons. Consequently, the null hypothesis that there is no difference between the perceived importance of information to MuBAs evaluating the condition of a city issuing general obligation bonds and how important the information is to analysts as perceived by MuFOs was rejected for 56% of the items. Table 1 shows the 36 items contained in the questionnaire, mean responses for MuBAs and MuFOs and standard deviations. To provide additional insight, the items are ranked in descending order based on the relative magnitude of mean responses for each group. Items with larger means were perceived as being more important than items with smaller mean values. Table 1 also shows the t-statistic and P-values. In addition, pair-wise comparisons for which the null hypothesis was rejected are noted. When interpreting mean responses for the 36 items, consideration should be given to the magnitude of the standard deviations. The standard deviation is a measure of the degree of agreement within each group regarding subjects' perceptions. The larger a standard deviation, the more dispersion that exists among subjects. Conversely, a small standard deviation indicates a high degree of agreement.

On an item-by-item basis, there appears to be a lack of consensus between MuBAs and MuFOs regarding the perceived value of information to MuBAs' decision models. A consensus does exist, however, between groups for those items perceived as being most important (Items 1, 2, 3, 4 and 5), and those items perceived as being least important (Items 32, 33, 34, 35 and 36). MuBAs and MuFOs do not value the remaining items similarly. A close examination of Table 1 reveals that mean responses for analysts are generally higher than mean responses for finance officers. This is true for 32 (89%) of the 36 information items. The higher perceived value by MuBAs suggest that preparers of municipal annual reports are underestimating the value of financial information to external users. Also, Table 1 shows that the standard deviations for MuBAs' responses are generally larger than for MuFOs' responses. This is true for 26 (72%) of the 36 items. These results indicate that finance officers are in closer agreement regarding their perceptions than are bond analysts.

Both MuBAs and MuFOs rated Items 1, 2, 3, 4 and 5 as being the most important relative to all others. MuFOs believe that the single most important item to MuBAs is the knowledge that municipal annual reports have been audited by an independent accounting firm (Item 3). MuBAs, however, rated this item as third in importance and indicated that information relating to municipal debt outstanding (Item 1) is more important to their investment decisions. The reader should note that the five highest ranked items provide information pertaining to investment risk. It is not surprising that analysts rated these items as most important since analysts are routinely involved in analysing municipal annual reports from an investment perspective.

Items 32, 33, 34, 35 and 36 were ranked the lowest in importance by both subject groups. Table 1 shows that the P-values for these items were not statistically significant. Accordingly, the null hypothesis for each pair-wise comparison was accepted, implying that finance officers can identify information which is less important to bond analysts' decision models. An interesting observation is the low perceived importance of Items 34 and 36, current replacement cost of general fixed assets and supplementary price level adjusted statements, respectively. Both items relate to inflation adjusted information. Recognising the significant impact that inflation can have on a city's financial condition, it is surprising that MuBAs do not value this information as being very important. The low perceived importance may be due, in part, to the fact that such information has not been traditionally disclosed in municipal annual reports. Table 1 also shows that MuBAs place a low value on information relating to municipal fixed assets (Items 32 and 35). These low scores support the contention that bond analysts are primarily interested in 'funds flow' information.

Although all items are not discussed individually, the reader is encouraged to make an item-by-item examination of the results contained in Table 1. Such an examination should give the reader a better understanding of the value MuBAs and MuFOs attach to different information items and the degree of agreement within each group regarding subjects' perceptions. Substantial insight can be gleaned from a close examination of the 20 items for which significant differences were noted. For example, an area of major concern in municipal financial reporting is disclosure of information relating to public employee pension plans. Recent studies have shown that annual reports of governmental units are not providing adequate disclosure of pension related information.¹³ In the current

¹³Robbins, W. A. and N. G. Apostolou, 'Pension Disclosure by State Governments: Impact of FASB Statement No. 36', *National Public Accountant*, August 1981, pp. 36-39.

Table 1
Differences in perceived importance of information items between MuBAs and MuFOs

Table 1 Differences in perceived importance of information items between MuBAs and MuFOs	Information items	Subject Groups						t-Test	
		Municipal Bond Analysts			Municipal Finance Officers			t-Statistic	P-value
		Mean response	Rank	Std. dev.	Mean response	Rank	Std. dev.		
1. Total debt outstanding		22.974	1	17.847	17.121	3	11.611	2.44	0.016*
2. Auditor's report		19.818	2	13.889	20.833	2	24.498	0.33	0.744
3. Audited by independent accounting firm		19.776	3	13.489	21.202	1	23.665	0.47	0.636
4. Information pertaining to litigation occurring after the date of the financial statements but before they are issued, which has a significant financial statement impact		18.773	4	14.070	15.410	4	10.824	1.67	0.097
5. Information pertaining to litigation having a potential significant impact on the financial position (e.g., conflict of interests statutes, etc.)		18.658	5	13.403	15.333	5	11.183	1.69	0.092
6. Interfund receivables and payables		16.481	6	16.935	9.512	20	7.333	3.34	0.001*
7. Disclosure of material legal violations of general state law or private acts (e.g., conflict of interest statutes, etc.)		16.474	7	13.859	14.378	7	10.482	1.07	0.288
8. Identification of key taxpayer(s)		15.211	8	13.392	7.667	30	7.131	4.38	0.000*
9. Identification of 'hard money' (e.g., revenues from services rendered) and 'soft money' (e.g., grants, etc.)		15.092	9	12.570	11.095	10	7.576	2.40	0.018*
10. Information pertaining to future capital improvements		14.792	10	12.279	10.393	12	7.080	2.75	0.007*
11. A description of the basis of accounting for the various funds and special groups of accounts		14.789	11	13.327	10.119	14	7.222	2.72	0.007*
12. Comparison of budgetary amounts with actual operating results		14.338	12	8.942	11.855	8	6.415	2.00	0.047*
13. A description of the fund structure and an explanation of each fund		14.247	13	10.011	8.155	27	6.318	4.57	0.000*
14. Segregation of current assets and liabilities from other assets and liabilities		13.701	14	10.410	10.595	11	8.970	2.02	0.045*
15. The actuarial present value of vested accumulated pension plan benefits		13.671	15	12.444	9.735	17	7.662	2.38	0.019*
16. A description of the accounting and funding policies for employee pension plan(s)		13.494	16	12.159	9.738	16	7.633	2.32	0.022*
17. Disclosure of whether the financial statements are prepared in conformity with Statements 1 and 2 of the NCGA		13.197	17	10.302	12.440	6	11.012	0.45	0.654

	Information items	Subject Groups						t-Test	
		Municipal Bond Analysts			Municipal Finance Officers				
		Mean response	Rank	Std. dev.	Mean response	Rank	Std. dev.	t-Statistic	P-value
18.	The actuarial present value of nonvested accumulated pension plan benefits	13.013	18	12.732	9.325	21	8.510	2.13	0.035*
19.	The recognition of pension expense and provision for funding for the period	12.922	19	7.790	9.774	15	8.674	2.43	0.016*
20.	The net assets of a pension plan available for benefits	12.816	20	9.833	9.643	19	7.691	2.26	0.026*
21.	Information regarding the method of accounting for encumbrance	12.390	21	8.417	8.631	24	7.499	2.98	0.003*
22.	Current market value of marketable securities	11.947	22	15.539	9.675	18	6.913	1.17	0.246
23.	A general description of the leasing arrangements for non-capitalised lease commitments	11.711	23	8.862	8.214	26	7.662	2.66	0.009*
24.	A statement that pension plan(s) exist, identifying or describing the employee groups covered	11.684	24	8.995	7.738	29	5.731	3.27	0.001*
25.	Functional reporting of expenditures (e.g., public safety, sanitation, welfare, etc.)	11.052	25	7.527	10.167	13	7.272	0.76	0.450
26.	The rates of return used in determining the actuarial present values of vested and nonvested accumulated pension plan benefits	10.947	26	7.908	9.073	22	7.233	1.55	0.123
27.	Commentary on results for the year and progress toward objectives	10.539	27	6.696	8.036	28	4.715	2.71	0.008*
28.	The measurement of expenses (as opposed to expenditures)	10.152	28	6.622	8.235	25	8.007	1.59	0.114
29.	Consolidated versus fund-by-fund financial statements	10.013	29	7.814	11.512	9	9.112	1.12	0.265
30.	Statement of operating objectives for the ensuing period	9.573	30	5.901	7.488	31	4.689	2.45	0.016*
31.	List of the principal officials who are responsible for financial affairs	8.173	31	6.743	5.881	35	6.243	2.22	0.028*
32.	Description of general fixed assets	8.000	32	4.750	7.120	33	5.256	1.11	0.267
33.	Accumulated unpaid employee benefits for vacation and sick leave	7.973	33	6.016	8.833	23	7.592	0.80	0.428
34.	Current replacement cost of general fixed assets	7.560	34	6.577	6.369	34	5.728	1.21	0.228
35.	Summary of changes in property, plant, and equipment by major classes for the several fixed assets	7.382	35	4.543	7.169	32	6.144	0.25	0.803
36.	Supplementary price-level adjusted statements	5.068	36	4.486	4.354	36	4.668	0.97	0.334

study, seven types of pension information required by generally accepted accounting principles to be disclosed in annual reports (see items 15, 16, 18, 19, 20, 24 and 26) were included in the questionnaire. As shown in Table 1, significant differences were found for six of the seven items, with MuBAs' perceptions being higher than perceptions of MuFOs. Apparently, finance officers are underestimating the importance of pension information to external users. This low perceived importance by MuFOs may be a contributing factor to the inadequate disclosure of pension information in municipal annual reports. Another interesting observation is the close clustering of mean responses for the seven items. Mean values for analysts' responses ranged from a low of 10.947 for Item 26 to a high of 13.671 for Item 15. This clustering suggests that MuBAs perceive pension information as being similar in importance.

Finally, to evaluate subjects' perceptions of the relative importance of information items, the relationship between group rankings was tested. The degree of association was measured statistically using Spearman's rank correlation procedure. A correlation coefficient of 0.7671 was calculated. The results indicate that a moderate relationship exists between MuBAs and MuFOs regarding the relative importance of all items. The null hypothesis that no association exists between groups in the population from which subjects were selected was rejected at a 0.001 significance level. The results suggest that MuFOs and MuBAs have similar perceptions of the relative importance of items to analysts' decision models.

Table 1 shows that subjects value 16 of the 36 items contained in the questionnaire similarly. The inclusion of items with similar means in the above correlation test may have resulted in rejecting the null hypothesis.¹⁴ To eliminate the effects of these items, the relationship between groups for the 20 items with significantly different means was measured. The Spearman's rank correlation coefficient

was calculated at 0.6391 and the null hypothesis was again rejected at a 0.001 significance level. Thus, although no consensus appears to exist between groups regarding the magnitude of assigned values as indicated on an item-by-item basis, the high correlation coefficients suggest that MuFOs have a basic understanding of MuBAs' information needs and can identify information believed to be more important in satisfying those needs.

Conclusion

Two general conclusions were drawn from this study. First, it was concluded that a moderate degree of agreement exists between MuFOs' perceptions of the relative importance of information items to MuBAs and the relative importance of items as perceived by MuBAs. The results suggest that MuFOs are capable of identifying information which external users believe is important to their investment decisions. The evidence supports the presumption that preparers of financial reports do perceive the information needs of external users. A second conclusion is that MuFOs do not perceive the value of information to MuBAs to be so high as MuBAs themselves do. Perhaps this is due partly to the fact that MuFOs are not accustomed to assessing the financial condition of cities from an investment perspective.

The results of this study should be of interest to those who are concerned with governmental accounting and reporting issues, especially those who participate in the standard setting process. For instance, from a policy making perspective, those items that MuBAs indicate are more important to their investment decisions should be considered when promulgating new accounting and reporting standards for governmental units. Such consideration is necessary if municipal financial reporting is to become more responsive to users' information needs. Also, in light of the limited research on the topic, it is hoped that this study will contribute to filling a void which currently exists in governmental accounting literature relating to the information needs of users of municipal annual reports.

¹⁴Chen, K. H. and S. J. Lambert, 'A Study of the Consensus on Disclosure Among Public Accountants and Security Analysts: An Alternative Interpretation', *Accounting Review*, April 1977, pp. 508-515.

Budgetary Attitudes: The Effects of Role Senders, Stress and Performance Evaluation

Frank Collins, Robert E. Seiler and Donald K. Clancy

Budgeting consists of a series of decisions resulting in an overall resource allocation plan. The purpose of this research is to examine important behavioural aspects of role processes in resource allocation decisions [4, 7].

Variables

Four variables are studied: (1) budget attitudes, (2) influence of role senders, (3) role stress and (4) performance evaluation.

Budget Attitudes

Many factors affect the revenue and cost performance of managers with respect to their budgets; for example, budget attitudes, aptitudes, weather, general economic conditions, or labour unrest. Plausible independent variables are numerous. Consequently we have chosen, as have others [4, 7, 13, 15], to measure attitudes toward achieving the budget as the dependent variable instead of actual performance.

Using the approach taken in Collins [3], 'Positive Motivation' is measured by determining the extent to which a person desires to make a personal effort to achieve the budget and the tendency to induce budgetary responsiveness in subordinates. 'Negative Motivation' is measured by determining the extent to which a person withholds his support from the budget, attempts to induce slack in the budget and the tendency to input erroneous or incompatible data into the budgetary system.

Influence of Role Senders

A role is a set of regular and enduring behaviours pertaining to a particular task or social function. Katz and Kahn [12] provide an excellent overview of role concepts. Also, see Sell, Brief and Schuler [20] for an extensive bibliography. One may enact the role of physician, professor or student. While a person enacts many different roles, in this research the salient roles are organisational ones. According to Katz and Kahn [12],

Roles describe specific forms of behaviour associated with given tasks; they develop from task requirements. In their pure or organisational form roles are standardised patterns of behaviour required of all persons playing a part in a given functional relationship...

Both appropriate and inappropriate role behaviour may occur. Organisational *norms* specify what constitutes appropriate role behaviour.

Budgetary norms are transmitted to a budgetee (a person subject to a budget) by:

1. Immediate Superior (Superior)
2. Immediate Subordinates (Subordinate)
3. Peer group of managers (Peer)
4. Budget Director (Director)

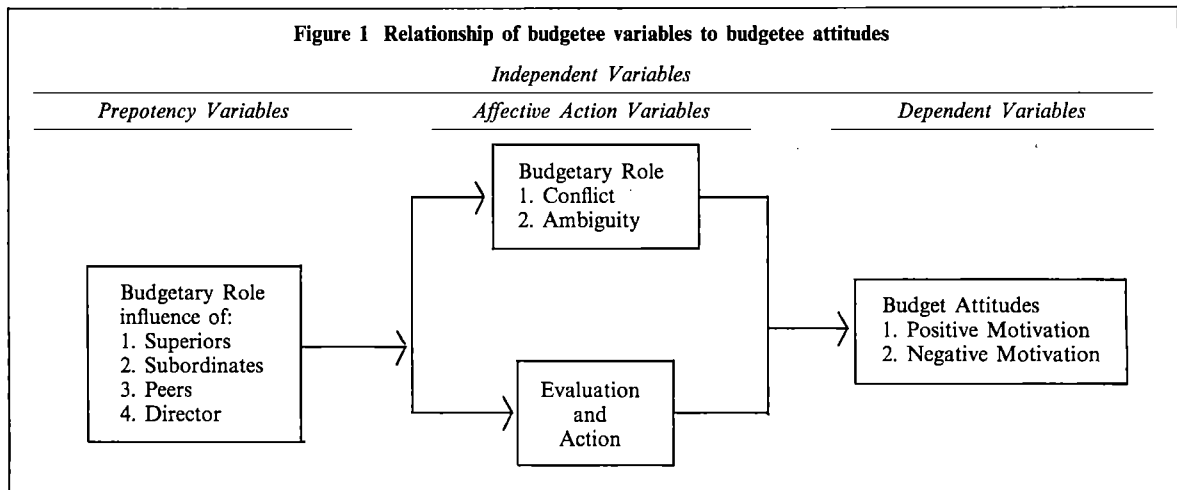
The Superior gives signals to the budgetee as to appropriate budget behaviour and evaluates performance. The Subordinate works for the budgetee. The Peer provides informal communication concerning budgets and survival, and also must perform under his own budget. The Director provides formal communications concerning budgets and intercedes in conflict situations.

Role Stress

Role stress consists of two facets: role ambiguity and role conflict. Role ambiguity (Ambiguity) exists when a person perceives uncertainty in what others consider to be 'good' performance. Role conflict (Conflict) exists when a person perceives opposing communications about what constitutes 'good' performance. (For a more elaborate discussion see [11, 12, 18, 20].)

Budget performance evaluation (Evaluation) is the perception or belief that budget variances are used in performance evaluation. Budget Action (Action) is the investigation and explanation of budgetary variances that pertain to the Supervisor's area of responsibility. Clancy [2] hypothesised that high Evaluation and Action gives the budget strong influence over attitudes.

Figure 1 Relationship of budgetee variables to budgetee attitudes



Research Model

The research model depicting the relationships among the variables is presented in Figure 1. There one may see that there are two classes of independent variables, prepotency and affective action variables. The prepotency variables are those that represent an existing behavioural state (extent of role influence) among the salient role senders. And, in an active and affective manner these role senders are seen to be involved in the second independent variable group: conflict, ambiguity, evaluation and action. Finally, these independent variables relate to the dependent variable of interest, budgetary attitude. The likely chain of events in a budgetary episode would be for the various role senders to possess varying degrees of role influence on the focal person and each other. Further, this prepotent influence is seen to influence conflict, ambiguity, evaluation and action. Lastly, a person's attitude toward achieving his budget is hypothesised to be associated with these independent variables.

Particularly in behavioural research it is difficult to specify a simple, but accurate, research model for several reasons. For example, the model depicted in Figure 1 is static. We have chosen to use this snapshot view because of the complexities and resource implications of stipulating and conducting time series research.

Next, we freely acknowledge that at times the associations might run from the dependent variables to the independent variables or among the independent variables in complex manners. Yet, one must start somewhere. We have chosen our particular model because at this stage in our research we are interested in the predictive validity (See Nunnally [17]) of the specified independent variables. If this is the case, it makes no difference which way the arrows run, as long as we are able satisfactorily to measure association of the selected variables with positive and negative attitudes. As later research develops on budgeting role pro-

cesses, then we would expect that the research models will be more causal and dynamic in nature (see Heise [10]).

Research method

A questionnaire was administered to 128 budgetees having major responsibility in two large firms.¹ The administration was kept anonymous by having the respondents mail the questionnaires directly to researchers.² There were 95 usable responses, a response rate of 74%.³

The Positive Motivation and Negative Motivation measures were developed by Collins [3, 5] and were used in a study investigating other motivational aspects of budgeting. The 'influence of role senders' was measured by asking the budgetees directly to judge the actual influence of the four role senders on their attitudes toward their budget responsibilities. The scale related to each role sender had a range of 1 (very little influence) to 6 (very high influence). The Ambiguity and Conflict variables were measured by using an instrument developed by Rizzo *et al.* [18]. This instrument has been used a number of times and is a standard

¹Two firms were selected, one a large utility and one a large tool manufacturer. Divergent organisations were chosen to see if such characteristics as locale, structure and technology made a difference to the results. No important differences existed. The average respondent was 48.8 years old, had been with the company for 22 years, had a bachelor's degree, and was in middle management.

²Additionally several managers were interviewed to make sure that the questionnaire was understandable and to watch for inconsistent results in the data.

³This relatively higher response rate was due, in part, to top-level management support for our research project. While this support was welcome, we went to great lengths to assure the respondents that their responses would be kept confidential. Assisting us in this regard was the fact that we had done research in these organisations in the past and had thus previously established a trusting relationship with the respondents.

instrument for measuring these role constructs. Evaluation and Action was measured by the response to a number of questions developed by Sapp and Seiler [19]. Appendix A presents the questions used and the average responses.

In order to provide a basis for future theory development, discriminant analysis⁴ was selected as a method to describe the relationships among the variables.⁵ This was performed separately for positive and negative budget attitudes.

The sample was divided into quartile groups by the positive and negative motivation measures. Then, discriminant analysis was performed to describe what characteristics distinguish the highest quartile from the lowest quartile. Figure 2 presents the standardised discriminant coefficients and other statistics on the discriminant function. The relative size of the coefficients can be interpreted as the relative ability of the variable to distinguish between the high and low attitude measures.

Results

As presented in Figure 2, positive and negative motivation have orthogonal discriminant functions. First, the respondent variables that distinguish low from high *negative* budgeting attitudes are:

1. *Influence of the Immediate Superior.* A more influential Superior in the budget process is associated with lower Negative Motivation.
2. *Influence of the Budget Director.* A more influential Director is associated with a higher Negative Motivation (budget slack, withdrawn support, or intentional errors).
3. *Conflict.* A perception of high Conflict in the budget process is associated with high Negative Motivation.

Second, the respondent variables that distinguish low and high *positive* attitudes are:

1. *Influence of Immediate Subordinates.* Those budgetees with high Positive Motivation view their Subordinates as influential in the budget process.
2. *Ambiguity.* A perception that the budget process has high Ambiguity is associated with a low measure of Positive Motivation.

⁴In Nunnally's [17] consideration of discriminant analysis, he prefers the usage of the technique with attitude- or value-type data as opposed to abilities or natural categories. Thus, the technique is appropriate for the type of data reported here.

⁵Some behavioural research attempts to show construct validity using such techniques as path analysis, cross-lagged correlations, etc. To do so validly, the domain of the observables must have been well-studied and mapped. Due to the tentative knowledge regarding budgetary role play, it is premature to attempt such research.

Figure 2
Standardised discriminant function results*

Standardised Discriminant Coefficients:	Negative Motivation	Positive Motivation
Superior	-0.56	
Subordinate		0.51
Peer		
Director	0.92	
Ambiguity		-0.51
Conflict	0.50	
Evaluation & Action		0.69
Canonical Correlation	0.40	0.52
Significance Level	0.10	0.01

*A step-wise, Wilks-criterion Discriminant Procedure was performed using SPSS.

3. *Performance Evaluation.* The heavy use of the budget variances in performance evaluation is associated with high Positive Motivation (personal effort to attain budget and influence others to attain theirs).

Discussion

As can be seen in Figure 2, Positive Motivation tends to be associated with a highly interactive situation involving both Subordinates and Evaluation & Action. (Recall that Evaluation & Action involves interaction between the budgetee and the Superior.) Also note from Figure 2 that there tended to be low Ambiguity. One might conclude that in the positive situation there was strong vertical interaction—Superior to Budgetee to Subordinate—and that as one result of this high interaction, there was little Ambiguity. This finding is consistent with the literature involving productive work groups (for example see [1, 9, 9a, 16].

In the case of Negative Motivation, the Superior was less influential while the Director was greatly influential and Conflict was high. Interestingly, Subordinate influence was not a factor here. This suggests that a condition of Negative Motivation was characterised by a truncated vertical relationship.

In evaluating the findings of this study one might look to the work of Rizzo *et al.* [18] where they found that:

The specific organizational practices which tend to be associated with *high role conflict and role ambiguity* are goal conflict and inconsistency, delay in decisions, distortion and suppression of information, and *violations of the chain of command*. The practices which tend to be associated

with *lower role conflict and role ambiguity* are emphasis on personal development, formalization, adequacy of communication, planning, horizontal communication, top-management receptiveness to ideas, coordination of work flow, adaptability to change, and *adequacy of authority*. (emphasis added)

Also, Morris, Steers and Koch [16] found evidence for the pervasive impact of participation in decision making on role conflict and ambiguity. They stated that, 'One key to reducing both role conflict and role ambiguity may lie in providing employees a major part in decisions affecting their jobs'. Similarly, Miles and Perrault [14] found that:

... supervisors and employees would establish a limited and task-related set of behavioral expectations for the employee role through goal setting activities. The goals serve as an important source of information for the employee in understanding the expected role he/she occupies.

One may see their findings mirrored in the results presented here.

Support for our findings is also found in Kahn *et al.* [11]. In their study they found that a person with role conflict would tend to withdraw as a coping measure and would tend to have a negative work attitude. In our results we found a similar tendency, in that the linking with Superior was much looser and there was an associated negative budgetary attitude. In the Kahn *et al.* study, persons with a positive work attitude tended to be involved in frequent and intensive role communications with salient role senders, and role ambiguity was low. Our results reflected this finding. Also providing support are the findings of Collins *et al.* [6] in their study of leadership styles *vis-à-vis* budgetary attitudes (attitudes were measured using the same instrument as in the present study). In their study they found that strong leadership based on contingency approaches was positively correlated with positive budgetary attitude and negatively correlated with negative attitude. A leadership style characterised by distancing and/or disinterest was correlated with a negative attitude toward the budget. In our study we found that high Superior influence and resultant action were similarly correlated with budgetary attitudes. Thus, one must conclude that high budgetary influence and involvement are importantly associated with positive budgetary attitudes. Finally, the seeming break in relationships under the negative budgetary motivation is symptomatic of small group behaviour under dysfunctional conditions. That is, under conditions of stress, small groups tend to break apart into subgroups.

While the findings of this study are tentative, one

must question the position of the Director *vis-à-vis* authority relationships in the organisation. For example, does having an influential Director lead to situations of high Conflict and Negative Motivation (or vice versa)? If so, what should be done? As usual, more research is necessary to evaluate these tentative suppositions. In particular, this study suggests that more research be done that focuses on the power/influence relationships of the Director.

Also, one can see in the results of this study, usefulness of role theory constructs in explaining human behaviour in an accounting context. Certainly, in the past decade there has been recognition that 'behavioural' factors are important to managerial accounting. Yet this literature remains fragmented, discussing, for example, such issues as participation, personality, level of budget difficulty, or frequency of feedback. In this regard, we hypothesise that research built around a role theory model will serve to integrate the research efforts and findings. It will be integrative since using this model will require researchers to consider the entire life space surrounding the research subject. And where researchers choose not to study the entire life space as depicted in the role model (for example, Cook's [8] study of feedback frequency) they would recognise and need to consider this abstraction from the total model.

Conclusions

Although we were pleased to find that our experimental variables (influence, role conflict and ambiguity, evaluation and action and budget attitude) were significantly associated with each other, we suggest that our findings are tentative and that the use of our predictive model would be premature at this time. It would be premature since the identification of causal relationships must be established before one may make practical, prescriptive statements. The correlational nature of our study does not permit this. Further, the research locale was limited: only two organisations were studied. Yet we feel that this study does make a contribution in that the results point the way for more intensive studies... one hopes of a longitudinal nature. And if researchers choose to perform such additional studies, our results suggest that influence, role stress measures, and evaluation and action measures, should be prime candidates for experimental variables of interest.

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Appendix A

Questions measuring the amount of budgetary role conflict and ambiguity (adopted from Rizzo *et al.*, 1970):

	Feeling toward budgetary aspects of my job (averages on a scale of 1 (low) to 6 (high))
1. I feel certain about how much authority I have.	4.67
2. I have clear, planned goals and objectives for my job.	4.60
3. I have to do things that should be done differently.	3.05
4. I know that I have divided my time properly.	4.02
5. I received an assignment without the manpower to complete it.	2.71
6. I know what my responsibilities are.	5.00
7. I have to buck a rule or policy in order to carry out an assignment.	2.68
8. I work with two or more groups who operate quite differently.	3.62
9. I know exactly what is expected of me.	4.63
10. I received incompatible requests from two or more people.	2.39
11. I do things that are apt to be accepted by one person and not accepted by others.	2.99
12. I receive an assignment without adequate resources and materials to execute it.	2.60
13. I receive clear explanations of what has to be done.	4.20
14. I work on unnecessary things.	2.32

Questions measuring the importance of budgetary role senders were:

		Feelings toward <i>budgetary aspects</i> <i>of my job</i> (averages on a scale of 1 (low) to 6 (high))
Person		
1.	Your immediate line superior (boss)	4.38
2.	Your subordinates (those to whom you are boss)	3.28
3.	Your peers (other supervisors at your level)	2.04
4.	The budget director (or other accounting personnel)	2.80

Questions measuring budgetary attitude and the tendency to take budgetary action are listed below. Questions 1–3 measured positive attitude, while 4–6 measured negative attitude. Questions 7–11 measured performance evaluation.

1.	How frequently do you make a sincere personal effort to achieve <i>your</i> budget objectives?	4.66
2.	How frequently do <i>you</i> feel a personal sense of failure when budget objectives are not met?	3.82
3.	How frequently do <i>you</i> make a sincere effort to induce responsiveness to budget objectives in your subordinates?	4.40
4.	When the opportunity arises, do <i>you</i> attempt to induce slack in your budget?	2.76
5.	How frequently have you withheld <i>your</i> support of the budget?	1.94
6.	How frequently have <i>you</i> allowed <i>erroneous</i> or non-compatible data to be put into the budget process even though this may hamper budget administration?	1.83
7.	My superior has expressed dissatisfaction to me about the results in my department when the budget has not been met.	2.61
8.	Large budget variances in my department are interpreted as poor performance.	3.00
9.	Budget variances in my department have been mentioned to me during performance evaluation interviews by my supervisor.	3.48
10.	I have to explain to my superior budget variances over which I have no control.	3.26
11.	My superior has held me personally accountable for budget variances in my department.	3.35

Market Efficiency and Legal Liability: Some Extensions and an Illustration

James A. Anderson and Morton Pincus*

In recent years considerable attention has been given to the nature of capital markets, the manner in which information is processed by those markets, and the resulting implications for accounting policy. The type of research devoted to these issues has ranged from highly esoteric to more 'practice oriented' attempts to relate academic research to everyday issues. The degree of success of these latter efforts is unclear, probably partly because the immediacy of the issues addressed has been questionable for all except those in a position to shape accounting standards directly. If the results and implications of new research efforts such as those involving the efficient markets hypothesis are ever to be well disseminated, academics should attempt to extend those implications into more areas of general concern.

Much of the existing efficient markets research has involved the general area of corporate disclosure. While most accountants are interested in disclosure for its own sake, there is another aspect of the research that may be of even greater immediate interest, i.e., the role of efficient markets in assessing liability for non-disclosure or for erroneous disclosure. There may be no other issue that captures the attention of practitioners as quickly as the question of their legal liability. In addition, the implications that exist for auditor liability have corollaries that are pertinent to liability in general, whether related to auditors or others, and to the assessment of social policy.

In a recent article, Greer and Morrissey mention in passing that 'it is surprising that this line of reasoning (based on efficient markets) has not been followed in third party liability cases.'¹ This same

observation had prompted a previous elaboration on some of the implications of market efficiency for auditor liability.² This paper reviews some of those implications and also discusses some implications for the assessment of damages. The application of the damage assessment implications is then illustrated in a simplified manner by examining a case that involved someone other than auditors.

Implications for auditor liability

Effects on Liability for Negligence

The nature of auditor liability is currently not precisely defined, either in the United States or in the United Kingdom. In both countries auditors' exposure is a mixture of important common law precedent, government regulation through statute and case by case enforcement and interpretation of the statutes. For example, the Securities Acts in the USA have long stipulated that the historic notions of privity of contract (the auditor is only responsible for the company that hired him) and justifiable reliance (the notion that anyone seeking redress from an auditor must prove that they relied on the auditor's alleged errors) were not acceptable. In spite of that the Securities Exchange Commission and the courts did not begin to enforce those aspects of the Security Acts until the

ing, Auditing and Finance, Fall 1978, pp. 49-57. To be noted is that while courts in the USA have not employed the reasoning of the efficient markets hypothesis, per se, some courts have acknowledged the existence of marketwide movements and (naively) adjusted firm-specific damages accordingly. See *Feit v. Leasco Data Processing Equipment Corporation et al*, 332 F. Supp. 544 (E.D.N.Y., 1971) and *Rolf v. Blyth, Eastman Dillon & Co., Inc., and Scott*, 570 F. 2d 38 (2d Cir., 1978). Also, see Reder, Barry, 'Measuring Buyers' Damages in 10b-5 Cases,' *Business Lawyer*, July, 1976, pp. 1839-1854.

²Anderson, James A., 'The Potential Impact of Knowledge of Market Efficiency on the Legal Liability of Auditors,' *Accounting Review*, April 1977, pp. 417-426.

*Comments by an anonymous referee and computing assistance by David Nasser are gratefully acknowledged. Remaining errors are the authors' responsibility.

¹Greer, Willis and Leonard Morrissey, Jr., 'Accounting Rule Making in a World of Efficient Markets,' *Journal of Account-*

1960s. Even now privity and justifiable reliance are used as defences in auditor liability cases, with mixed success.

One of the potential effects of knowledge of market efficiency is to reaffirm many of the prescriptions of the Securities Acts,³ especially with respect to liability for negligence and deceit. This reaffirmation may have repercussions with respect to the efficacy of 'common law defences', and for other countries that may consider similar regulation.

The historic common law notion that financial statements are prepared primarily for the use of management and are 'only incidentally' for the use of third parties is one of the underpinnings of the argument that auditors ought not to be held liable to third party investors for simple negligence. This idea was expressed most succinctly in the case of *Ultramares v. Touche* in the USA.⁴

The research into the reaction of the securities markets tends to dispute that notion, and to support more recent statutory and case judgements that liability to third parties cannot be so easily constrained. Essentially, it is hard to argue that such information is 'incidentally' for use by investors when the market as a whole 'fully impounds' such information quickly and without bias, seems to anticipate the release of such information, and exhibits abnormal price and volume behaviour around the formal release dates of financial statements. Such evidence suggests that investors perceive accounting information to be more than incidental.

Another argument against responsibility to investors is the so-called 'foreseeability rule' that seeks to limit an auditor's duty to protecting only those whose injury is reasonably foreseeable. However, while the specific individual investor who might be damaged by negligent auditor behaviour is unknown, it is consistent with legal precedent to find responsibility to individual members of a foreseeably injured class. The case of *Rusch Factors, Inc. v. Levin* in the USA effectively affirmed this idea,⁵ and efficient markets research tends to support the conclusions in those cases. Since auditors must be aware that financial statements are publicly available information that will, in an efficient market, be reflected in security prices, it follows that resulting injury to the class of investors is reasonably foreseeable. This inference, together with the idea that financial statements can be shown to be more than incidentally for investor use, has the effect of weakening the common law

insulation of auditors from liability for simple negligence.

Effects on Liability for Deceit

The major effect of an efficient market on liability for deceit is the negation of the 'justifiable reliance' concept. This idea suggests that there must be a cause and effect relationship between the actions of auditors and the damage suffered by investors in order for liability for deceit to be established. The intent of this idea is to limit recovery of damages only to those who read the financial statements and acted on the basis of what was contained therein and to exclude those who did not read the statements and hence could presumably have acted as they did even if the auditor had not performed improperly.

In an efficient market, however, the individual need not be aware of the specifics of a firm's financial statements in order to act with the confidence that the information contained in those statements will be (or already has been) fully impounded in security prices. Except for any misstatement contained in the financial reports, the investor would face a 'fair game' in which the expected return of a security would be commensurate with its risk. Whether or not the financial statements were examined the investor could act on that fair game expectation, and the examination of specific reports would be irrelevant. The price of a security to both readers and non-readers of financial statements would reflect all publicly available information, including any misrepresentation. Except for the misrepresentation each investor could expect the price to reflect the appropriate expected risk and return. It seems unreasonable to compensate those who are ignorant of that implication of market efficiency but yet fail to compensate those who are aware of it and act accordingly.

The effect of efficient capital markets may be, therefore, to justify the provisions of the SEC Acts that eliminate 'justifiable reliance' and 'foreseeability' as requirements for damage claims, should the courts choose to accept efficient markets evidence. However, the significance of that justification cannot be assessed without consideration of the measurement of damages allegedly created by auditors. As will be discussed later, the effect of market efficiency on damage assessment is not limited to cases involving auditors, but is relevant any time the capital market is the arena in which damages allegedly occur.

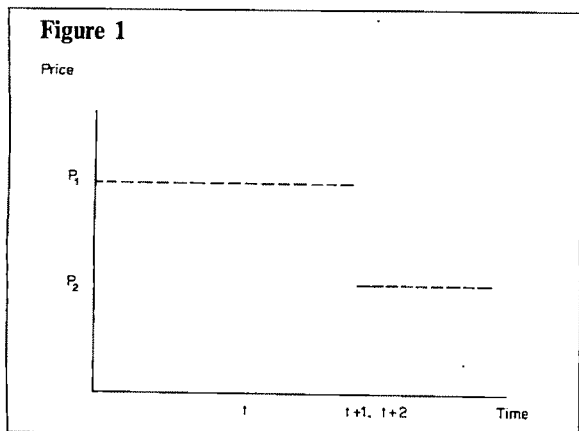
Damages in an Efficient Market

There are two crucial attributes that a justifiable claim for damages must have. First, the injured party must show that, except for the misleading actions of the party from whom recovery is sought, some action that would have avoided loss could have been taken. Second, in the absence of such

³The Securities Acts apply to all firms whose securities are publicly traded in the USA.

⁴*Ultramares Corp. v. Touche*, 255 N.Y. 179, 174 N.E. 441 [1931].

⁵*Rusch Factors, Inc. v. Levin*, 284 F. Supp. 85 [1968].



avoidance action, losses were suffered that *would not have occurred* had the defendant acted properly. Both of these points will be illustrated with the aid of Figure 1.

The first point has been discussed elsewhere.⁶ The essentials mentioned there revolve around the security market's capacity for virtually instant adjustment to new information. Assume that at time t on Figure 1 the auditor discovers, or negligently fails to discover, a material fact pertinent to the value of Security X and fails to report it and at time $t + 1$ that fact is somehow made public and its effect is to cause a drop in the price of Security X from P_1 to P_2 . That drop in price, occurring at time $t + 2$, results in a loss to the shareholders of company X in the amount represented by the interval P_1 to P_2 multiplied by the number of shares outstanding. Because of the very rapid adjustment characteristic of the market, the interval $t + 1$ to $t + 2$ is extremely small, thus precluding the shareholders from avoiding loss.

However, had the auditor acted properly and reported the relevant facts at time t , the period of adjustment from P_1 to P_2 would also have been extremely small and the shareholders would still have been unable to avoid loss. Thus, unless the shareholder at $t + 1$ purchased the securities between t and $t + 1$, the loss was unavoidable and therefore was not caused by the actions of the auditor.

Of course, it is possible that additional 'real' damages might be suffered by shareholders as a result of the auditor's failure to disclose at time t . For example, failure to identify an ongoing fraud could lead to continuation of the fraud from t to $t + 1$ and thus to additional losses. Efficient markets research has nothing to say on that possibility. However, it would still be true that losses suffered up to time t would have been unavoidable even if the auditors had disclosed the situation promptly.

The second crucial attribute mentioned above has implications for both auditors and others who are involved in situations where loss is defined by security price deviations. Irrespective of the culpability of an auditor or other 'damager' the extent of recovery should be limited to that loss that would not otherwise have occurred. Put another way, damages should be limited to price changes that deviate from those expected in the absence of the supposedly damaging act. If, for example, another independent event can be shown to explain observed price deviations, then the alleged 'damager' cannot be held responsible.

A hypothetical example may clarify this point. Suppose an event, A , occurs at time t that is the responsibility of a particular individual and that is pertinent to company j . Suppose further that, at the time of event A , the price of company j 's securities drops precipitously and, because of the proximity of these two occurrences, management of company j feels that event A has caused the price drop and files suit to recover damages. The basis of their claim could be expressed as follows:

$$(R_{jt} | A) - (R_{jt} | \text{not } A) < 0 \quad (1)$$

where R_{jt} is the return on security j at time t and A is the supposedly damaging event.

The application of (1) requires estimation of what the return would have been in the absence of A , which is not necessarily an easy task. As a first approximation it might be tempting to compute:

$$R_{jt} - R_{j,t-1} \quad (2)$$

where $R_{j,t-1}$ is the observed return in the previous period. However, this measurement of the damage fails to control for other events that might have caused a change in return. A better way to frame the issue is the following modification of equation (1):

$$(R_{jt} | A, B, C, D) - (R_{jt} | B, C, D) < 0 \quad (3)$$

where B , C and D are other events that have a known relationship with R_{jt} and are independent of event A .

The foregoing emphasises that $(R_{jt} | B, C, D)$ can be a highly uncertain quantity. As such it can be regarded as a random variable with some probability distribution. The variance of that distribution will indicate the precision with which the return, in the absence of A , can be estimated. In this perspective the mere establishment of a basis for a damage claim, let alone its amount, should require more than a simple point estimate of equation (3). For example, a court might require a specific probability (say, 0.95) that the actual return was less than it would have been in the absence of event A before even considering the

⁶Anderson, *Ibid.*

amount of damage.⁷ As a practical matter this might require that the actual return should be at least, say, two standard deviations below the expected return in the absence of event *A* to establish a basis for a damage claim.

This general approach to assessing the significance of specific actions as they relate to market behaviour has wide potential application. The impact of legislation, executive actions, strikes, auditor actions, price changes by corporations and press statements made by corporate executives and others are examples of events whose impact could be assessed by formal consideration of the behaviour of the securities market. Proper use of the approach requires (1) faith in the market's ability to process a wide variety of information types in an efficient manner, (2) the ability to identify the timing of the occurrence of the event (*A*) whose impact is under study, and (3) the ability to identify the other events (*B*, *C*, *D*) that are relevant to the firm and to control for their effects. An illustrative case will serve to clarify these points further.

Case Study—Telex v. Briloff

Background

On May 11, 1970, *Barron's* published an article written by Professor Abraham Briloff that was highly critical of the accounting practices employed by the Telex Corporation.⁸ Telex Corporation responded on May 27, 1970, by filing a \$110 million dollar law suit on behalf of its shareholders, charging that *Barron's* and Briloff had 'deliberately and maliciously' damaged Telex's reputation in the financial community. This damage claim followed what appeared to be an exceptional decline in the market price of Telex's stock after the publication of Briloff's article.

On June 15, 1970, *Barron's* published a 'Correction and Clarification' in which substantial portions of the original article were retracted. In that same issue Briloff concurred with that 'clarification'.⁹ He did so by citing his willingness to 'correct and clarify any assertions which may have been based on my study of the documents

available as part of the public record but which, in the light of additional documents (not heretofore available, or at least not part of the public record) serve to change the earlier analysis'. The following elements of the original article were specifically retracted:

1. The statement that 'Telex is not really a manufacturer, but merely a middleman'.
2. The assertion that Telex had contractual obligations to pay for the repair and maintenance of computer tape drives and disc pack drives on lease, and that Telex had not established sufficient reserves for such obligations.
3. The description of Telex's sales to Hudson Leasing as 'putative' (retracted after *Barron's* examined the sales agreements and determined that Telex bore no substantial economic risk).
4. The statement that Hudson Leasing had the right to 'effectively neutralize' Telex's subsequent operations should Hudson be unable to re-lease equipment leased from Telex.
5. The implication that the stability of Telex's source of supply of disc pack drives was in jeopardy.
6. The statement that 'both prospectuses' (Telex and Hudson), failed to disclose the existence of a common director.

Briloff acknowledged the propriety of these corrections, but continued to insist that his overall conclusion was correct, i.e., that Telex had inappropriately recognised revenue from the capitalisation of leases of equipment to customers.¹⁰ It is important to note, however, that, in the absence of the damaging assertions that were retracted, the basis for his opinion was essentially simple, i.e., that the leases were subject to cancellation by the lessee. While he may have been correct, the important fact for our purposes is that he could hardly have been disclosing any real news to the market, since the nature of Telex's lease arrangements (including the cancellation terms) was clearly disclosed in the Notes to Telex's Financial Statements. Thus, all of his criticisms were taken from publicly available sources, including the one remaining issue that led him to adhere to his fundamental conclusion.

Research in capital market behaviour has considerable relevance for this case, for several reasons. First, as the paragraphs above indicate, Briloff apparently relied on publicly available information. Because publicly available information is the type of information that has concerned most

⁷Leas, P. J., 'The Measure of Damages in Rule 10b-5 Cases Involving Actively Traded Securities,' *Stanford Law Review*, January 1974, pp. 371-398. See also Kripke, Homer, 'Letter to Editor,' *NYU Law Review* 1976, pp. 914-915. Leas employs an Abnormal Performance Index (API) to measure damages in Rule 10b-5 cases, given that damages are acknowledged to exist in the first place. It seems to us that the first step, and the one most amenable to 'efficient markets' testing, is to determine whether damages can be shown to have been suffered in the first place.

⁸Briloff, Abraham, 'Tomorrow's Profits?,' *Barron's National Business and Financial Weekly*, May 11, 1970, pp. 3, 12, 14.

⁹Editors, 'Correction and Clarification of May 11, 1970, Telex Article,' *Barron's National Business and Financial Weekly*, June 15, 1970, p. 3.

¹⁰Briloff, Abraham, 'Letter to the Editor,' *Barron's National Business and Financial Weekly*, June 15, 1970, p. 3.

efficient market research the applicability of the research is quite direct. Essentially, existing evidence implies that Briloff's article should not have had any substantial impact if he relied solely on information that was already available, unless his allegations induced others to alter their behaviour in some manner, e.g., reduction in credit lines by banks.

The second reason that this case is especially suitable for a capital market analysis is that timing of the supposedly relevant events is so easily determinable. The dates of the original article, of Telex's suit, and of Barron's retraction are all obvious. Thus, it is not necessary to make restrictive assumptions about the timing of these items, unless there is some evidence that they may have been anticipated. In an auditor liability case the timing of events would be difficult for outsiders to determine, but ought to be identifiable by the courts, given their subpoena power.

Finally, there are several additional variables that have been identified in recent research as being generally important in the determination of securities' rates of return. Because Telex is a New York Stock Exchange listed firm, the results of that research ought to be applicable to this case. The selection of the variables to be considered follows from an examination of previous research.

Selection of explanatory variables

Market Factors

The most obvious and frequently discussed determinant of security returns is the general economy, or 'market'.¹¹ Sensitivity to market-wide movements has been shown to be of importance in explaining individual security rates of return.¹² For even relatively small portfolios (8-10 securities) the importance of the market factor is even larger.¹³

At the individual security level, however, the explanatory power of the market factor is not well defined. In general, the relationship of market and individual security returns is both weaker and less stable than the relationship between market and portfolio returns. On an *a priori* basis the market factor is expected to be important, but not all important, in assessing the returns of the securities of a single firm like Telex. Consequently, a market factor should be included in attempting to control for potentially important variables, but the

specification of important variables ought not to stop with the market factor. The market factor is denoted R_m .

Industry Factors

In addition to the relationship between a security and the market as a whole, industry returns have been shown to have a relationship with security returns.¹⁴ Although the relationship is generally not as strong as the market factor's, it is of sufficient magnitude that it ought not to be ignored. Furthermore, for particular firms and particular industries it is possible that a major above average association could exist. At the individual security level such potentialities cannot be ignored. Thus, a second systematic factor, industry returns, (R_{it}) will be isolated and its effect controlled.

There is a potential danger in including an industry factor in this particular example. The industry to which Telex belongs is fairly small and it is conceivable that Briloff's comments, while specifically about Telex, could have a detrimental effect on the entire industry, to the extent that this could have created suspicion about firms not mentioned by Briloff. If that were true the inclusion of an industry factor as a 'control' in the model would obscure the actual effect by extracting it from the 'unexplained' portion of Telex's return. While we consider the likelihood of Briloff's article being that powerful a factor to be quite small, we will, in this case, also examine the relationship between Telex's returns and other variables while ignoring the industry factor.

A priori there is reason to expect high correlation between industry returns and market returns. To avoid potential problems of multi-collinearity the industry factor used is actually the residual from the following regression:¹⁵

$$R_{it} = a + bR_m + e_{it} \quad (4)$$

Thus, the industry variable controlled will be that portion of industry returns that is not explained by market returns.

Operationally, the definition of 'industry' used is the COMPUSTAT list of firms in the computer industry (excluding Telex), Industry Number 3573. Thus, the association between the returns on this group of firms and returns on Telex will be determined.

¹¹Fama, Eugene, 'Efficient Capital Markets: A Review of Theory and Empirical Work,' *Journal of Finance*, May 1970, pp. 383-417.

¹²King, Benjamin F., 'Market and Industry Factors in Stock Price Behavior,' *Journal of Business*, January 1966, pp. 139-190.

¹³Beaver, William, Paul Kettler and Myron Scholes, 'The Association Between Market Determined and Accounting Determined Risk Measures,' *Accounting Review*, October 1970, pp. 654-682.

¹⁴King, *Ibid.* and Magee, Robert P., 'Industry-Wide Commonalities in Earnings,' *Journal of Accounting Research*, Autumn, 1974, pp. 270-287.

¹⁵Brown, Philip and Ray Ball, 'Some Preliminary Findings on the Association Between the Earnings of a Firm, Industry, and the Economy,' *Empirical Research in Accounting: Selected Studies*, 1967, *Supplement to Journal of Accounting Research*, 1967, pp. 557-577.

Firm Specific Factors

Firm specific factors have not been researched as thoroughly as have systematic factors, largely because they are easily diversified away by forming portfolios of securities.¹⁶ Consequently, they are sometimes considered to be less important than systematic factors from a global perspective.

In the case of a single security these factors may be of great significance. As libel, auditor liability and damage awards relate to single securities, the notion that firm specific events can be ignored or diversified away has clearly never been accepted in a legal context.

When the possibility of ignoring the effects of firm specific events is ruled out, the problem of identifying and controlling for such events becomes paramount. Unfortunately the list of possible events is virtually without end, and previous attempts to identify them in some organised way have been relatively unsuccessful.¹⁷

A surrogate measure does exist for a set of events that seems to be consistently important. That set consists of those events that lead to the measurement and reporting of income on a firm's financial statements. More specifically, to the extent that financial statements report 'unexpected' income the market appears to perceive either the income report, or (more probably) the events that led to the income report, as reflecting firm specific events that are of significance in assessing equilibrium prices of securities.¹⁸ Thus, consideration should be given to isolating the effects of any unusual or unexpected changes in earnings (see footnote 23).

The appropriate operational definition of unexpected earnings is a moot question. A large and growing body of research on the development of statistical earnings expectations models exists, yet no single best form of expectations model has been isolated. In addition, the possibility remains that no current statistical model forecasts as well as analysts who rely on a larger information set. Thus, the selection of a model from which to isolate unexpected earnings for Telex is bound to be an arbitrary and ambiguous choice.

Several factors are important for purposes of discussion. First, a few forms of quarterly earnings expectations models are consistently inferior. The pure martingale (random walk model), for example, does not perform well.

Second, models that perform well share the characteristic of considering both seasonal and cyclical earnings changes. Thus, both 'adjacent quarter' movements and 'quarter to quarter' movements across years probably ought to be included in any model selected.¹⁹

Third, more recent existing research on earnings expectations deals primarily with quarterly earnings. For purposes of examining the effects of events that occur over a period of a few days or weeks, quarterly observations of price movements are probably not sufficient. Consequently, inclusion of an unexpected quarterly earnings variable would be inconsistent with the timing of the observations of the other variables being studied. On the other hand, there is no widely published earnings number that appears at more frequent intervals than quarterly. 'Daily income,' for example would be a difficult number to identify and/or justify. Thus, if firm specific earnings are to be incorporated into a model, two problems must be handled: (a) an expectation model must be selected in light of points one and two above, and (b) quarterly observation of earnings must be reconciled with more frequent observations of the other relevant variables.

The model used to isolate *expected* quarterly earnings is of the following form:

$$\hat{E}_{T,Q} = E_{T,Q-4} + (1/3)[(E_{T,Q-1} - E_{T,Q-5}) + (E_{T,Q-2} - E_{T,Q-6}) + (E_{T,Q-3} - E_{T,Q-7})] \quad (5)$$

where $\hat{E}_{T,Q}$ = Telex expected quarterly earnings, $E_{T,Q-i}$ = actual Telex quarterly earnings as reported for quarters $Q-i$, $i=0$ to 7 previous quarters.

This model (martingale with non-constant drift) was used previously by Joy, Litzenberger and McEnally.²⁰ It considers both seasonal and cyclical elements of earnings and thus satisfies criterion two above.²¹ Deviations from the expectations implied by this model will be treated as unexpected earnings.

It should be reiterated that there is nothing magical about this model. In a 'real' case it might be desirable to 'fit' a firm specific model to the time series of the earnings of the firm in question. For our purposes of illustration such complexity is probably not warranted. Thus, we have selected a model from among those used in the literature.

¹⁶Beaver, William, 'The Behavior of Security Prices and its Implications for Accounting Research (Methods),' *Supplement to the Accounting Review*, 1972, pp. 407-437.

¹⁷Meyers, Stephen L., 'A Re-examination of Market and Industry Factors in Stock Price Behavior,' *Journal of Finance*, June 1973, pp. 697-705.

¹⁸Ball, Ray and Philip Brown, 'An Empirical Evaluation of Accounting Income Numbers,' *Journal of Accounting Research*, Autumn 1968, pp. 159-178.

¹⁹Foster, George, 'Quarterly Accounting Data: Time Series Properties and Predictive-Ability Results,' *Accounting Review*, January 1977, pp. 1-21.

²⁰Joy, O. Maurice, Robert Litzenberger and Richard W. McEnally, 'The Adjustment of Stock Prices to Announcements of Unanticipated Changes in Quarterly Earnings,' *Journal of Accounting Research*, Autumn 1977, pp. 207-255.

²¹Foster, *Ibid*.

The problem of relating quarterly earnings to more frequent observations of the other variables requires that some assumptions be made about the pattern of quarterly earnings report anticipation. For example, if quarterly earnings reports are complete surprises to the market, the market's reaction to those reports would occur at and immediately following the date of the announcement. On the other hand, if the quarterly earnings are fully anticipated by the first month of the quarter in question, then the full market reaction should occur in that month, with no reaction in succeeding months up to the announcement date. For purposes of assessing contemporaneous association of unexpected quarterly earnings and monthly price movements, the *pattern* of anticipation is clearly very important.

There is considerable evidence that earnings for a period are anticipated by the market within that period, both for annual and quarterly reports. Whether this anticipation is a continuous process or occurs in discrete stages is a moot point. For purposes of examining the Telex case a continuous process is assumed such that unexpected earnings for any *month* are equal to one-third of the unexpected earnings for the quarter of which that month is a part. This assumption is, of course, subject to challenge, but it serves the purpose of recognising the 'leakage' of income measurement information and is also consistent with the anticipatory pattern found by Joy, Litzenberger, and McEnally.²² The model is

$$I_{T,i} = (\hat{E}_{T,Q} - E_{T,Q})/3 \quad (6)$$

where $I_{T,i}$ = unexpected Telex earnings per share in month i and $\hat{E}_{T,Q}$ is from equation (5).

Of course, as mentioned with respect to industry effects, it would be inappropriate to 'control' for factors that might themselves have been influenced by Briloff's actions. For example, if Briloff's actions had led to the cancellation of orders for Telex's products we would be amiss in 'controlling' for the earnings effect. We have no way of knowing whether that occurred, so we will also test for the effect of Briloff's article *without* the earnings factor. In a 'real' case setting it would be necessary to determine whether such real operating effects were induced by the defendant (see footnote 24).

The selection of an expectations model and a transformation of unexpected quarterly earnings into unexpected monthly earnings completes the set of independent variables whose effects should reasonably be controlled. The general form of the question to be examined, as expressed in Equation 3 is:

Were there unusually low returns on the common stock of Telex around the time of Briloff's attack on Telex's accounting practices, after considering the effects of market returns, industry returns, and any unexpected earnings?²³

Short-Term and Overall Effects

If it could be determined that only a single (unanticipated) event occurred, the above approach would be appropriate. However, if several related and potentially offsetting events occur within a month, the ability to isolate the effect of one or each of the events is hampered. On the other hand, if the purpose is to gauge the total (net) effect of closely occurring related events, the above approach is suitable. In the Briloff/Telex case, where several related events occurred, a court might be interested in both short-term and overall effects. Hence, it will be necessary also to provide evidence of the market behaviour associated with each of the events occurring between publication of the initial Briloff article and its retraction.

Such short-term evidence cannot be detailed using the methodology described above because unexpected earnings cannot accurately be estimated for periods of less than a month. As an alternative, only the market-wide and industry factors will be controlled for, and daily stock returns will be used. The focus here will be to answer the following set of questions:

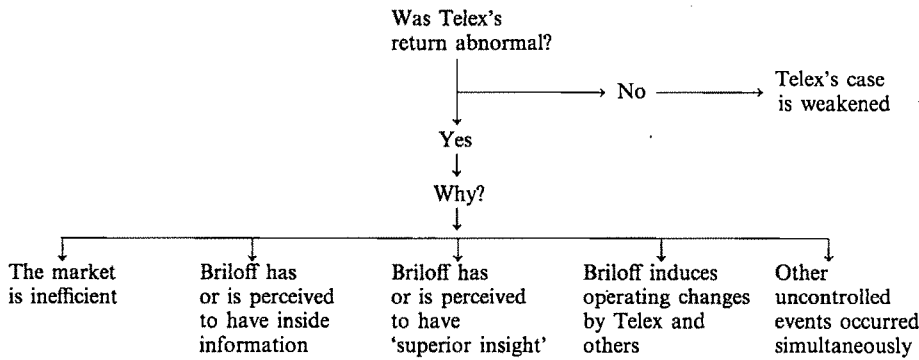
Were there unusually low returns on the common stock of Telex surrounding (1) Briloff's attack on Telex's accounting practices, (2) the filing of the suit against *Barron's* and Briloff by Telex, and (3) the retraction and dropping of the suit, after considering the effects of market returns and industry returns?

Limitations of the Methodologies

It is impossible for either methodology to answer all the pertinent questions that one might ask in a particular case. In essence we can offer information about the first step in the following progression of inquiry that might exist in a case.

²³G. Foster, 'Briloff and the Capital Market,' *Journal of Accounting Research*, Spring 1979, pp. 262-274, examined the market behaviour surrounding the publication of 15 articles by Briloff and found that criticised firms suffered on average a negative effect. We are interested in a single firm since that is the subject of the law suit, and thus must consider controlling for factors additional to those controlled for by Foster. See also footnote 21.

²²Joy et al., *Ibid.*



The implications of each of the possible explanations for a 'yes' result at the first stage would be different. For example, if there were changes in the behaviour of Telex's management it might be difficult to blame Briloff for any adverse consequences resulting from those changes. On the other hand if the market reacts to Briloff because he 'normally' has superior insight, then he might be held accountable when his insights are incorrect. In any case, the question in the first box is the first question to answer.

The Burden of Proof

For reasons based both on capital market research and on legal rules, the burden of proof should be on Telex to demonstrate that damages resulted from Briloff's article. The research based reasons are straightforward. If Briloff relied strictly on publicly available information, his article should not have resulted in any new information being transmitted to the market. In that case no abnormal movements in Telex's rates of return would be expected and the expectation would be that Briloff's article, by itself, had no effect.

The legal reasons are also straightforward. Briloff, as the alleged wrongdoer, would not bear the burden of proof. Rather Telex would need to demonstrate that it was damaged by his action. This requirement is analogous to a null hypothesis that, once again, Briloff's article had no effect.

Methodology—Overall Effects—Monthly Data/Unexpected Earnings

In order to examine the significance of the May and June, 1970, price deviations, a multiple linear regression model is used. That model has the following form:²⁴

$$R_{Tt} = a + bR_{mt} + b'e_{it} + b''I_{Tt} + u_t \quad (7)$$

where

R_{Tt} = Rate of return for Telex's stock for month t ,

R_{mt} = Rate of return on Standard & Poor's 425 last day stock index in month t , including dividends,

e_{it} = Rate of return on the industry index in month t (not captured by R_{mt}), from Equation (4),

I_{Tt} = Telex unexpected earnings per share in month t , from Equation (6),

a, b, b', b'' = estimated regression parameters,
 u_t = error term.

Data to estimate the model were obtained from *The Wall Street Journal* (quarterly earnings) and PDE COMPUSTAT (S&P 425, industry companies' and Telex's prices and dividends) for the period 3/68 to 4/70. Monthly returns were computed as follows:

$$R_{jt} = \frac{P_{jt} - P_{j,t-1} + D_{jt}}{P_{j,t-1}}$$

where

R_{jt} = company j rate of return for month t ,

P_{jt} = market price per share of company j at the end of month t ,

$P_{j,t-1}$ = market price per share of company j at the end of month $t - 1$,

D_{jt} = company j dividends for month t .

Telex and S&P rates of return were computed in the same way. For the industry rate of return used in Equation (4)

$$R_{it} = \frac{\sum P_{j,t} - \sum P_{j,t-1} + \sum D_{j,t}}{\sum P_{j,t-1}}$$

where

R_{it} = industry rate of return for month t . R_{it} includes all seven firms for which informa-

²⁴Four variations of this model were actually used in order to be as complete as possible. See Note to Table 1, and Note 2 to Table 2. As indicated in those Notes, essentially the same results are observed in each case.

Table 1
The Model and Relevant Statistics
The Model:

$$R_{Ti} = 0.041 + 0.837R_{mi} + 1.532e_{ji} + 0.616I_{Ti}$$

where:

R_{Ti} = monthly return on Telex's stock in month t ,

R_{mi} = return on S&P 425 in month t ,

e_{ji} = return on SIC industry No. 3573 (excluding Telex) in month t , not captured by R_{mi} ,

I_{Ti} = computed unexpected income per share for Telex in month t .

Statistics—Coefficients and Model

	bR_{mi}	$b'e_{ji}$	$b''I_{Ti}$
Standard Error	0.670	0.461	0.317
t -statistic (coefficient = 0)	1.25	3.32	1.94
Statistical significance of t -statistic	0.223	0.003	0.064
$F = 7.88$ (significant at 0.001)			
$R^2 = 0.496$; $\bar{R}^2 = 0.433$ (adjusted for degrees of freedom).			

Note: Three other models also investigated yielded the following results (statistical significance levels in parentheses):

(1) Market model:

$$R_{Ti} = 0.070 + 1.126R_{mi}; \quad R^2 = 0.063; \quad \bar{R}^2 = 0.027$$

(0.200) $F = 1.73$ (0.199)

(2) Market model with industry factor:

$$R_{Ti} = 0.070 + 1.126R_{mi} + 1.805e_{ji}; \quad R^2 = 0.447; \quad \bar{R}^2 = 0.370$$

(0.114) (0.001) $F = 8.95$ (0.001)

(3) Market model with unexpected earnings factor:

$$R_{Ti} = 0.026 + 0.686R_{mi} + 0.937I_{Ti}; \quad R^2 = 0.263; \quad \bar{R}^2 = 0.204$$

(0.396) (0.015) $F = 4.49$ (0.022)

All models had statistically insignificant 'market betas'. Further, the model reported in the text had the greatest explanatory power.

tion was available for the period of the study, but does not include Telex.

Using the model in Equation (7), forecasted monthly returns for Telex were calculated for May 1970 (the month of Briloff's article), and June 1970 (the month of *Barron's* retraction). The forecasted returns on Telex's stock were then compared to the observed returns in those months to determine whether the actual returns were abnormal.

Results—Monthly Data

Detailed results of the use of the regression model are presented in Tables 1 and 2. The major results are summarised below.

The general conclusion is that the returns on Telex's stock cannot be considered abnormal in either May or June, 1970. However, the results are suggestive even beyond that single statement.

For May, 1970, the actual return is only slightly less than the expected return and well within one standard error of the expected return. Thus, there is support for the notion that Telex was not significantly harmed by Briloff's article.

The second suggestive aspect of the results concerns the June, 1970 return. Although the actual return for June is not two standard errors from the expected return, it is very close. However, it is 'abnormally' higher than expected. The full relevance of that fact to an allegation of damage by Briloff may not be immediately obvious. Obviously the retraction itself might have had some effect, but the possibilities go further and are more consistent with the notion of market efficiency.

Telex's response to Briloff's original article prompted *Barron's* clarification on June 15. The response contained 'additional documents not heretofore available... as part of the public record', in Briloff's words. It is possible that *Barron's* retraction was the first public airing of those documents, and hence could have provided new information to the market. This information was submitted by Telex and hence was presumably favourable to Telex. In that case the expectation would in fact be for a positive effect, which was observed. There is a certain irony in the possibility that the most significant result of the exchange between Briloff and Telex was that Briloff forced

Table 2
Telex Rates of Return

	Predicted by Model	Actual	95% Confidence Interval
May, 1970	-0.264	-0.294	-0.609 to 0.082
June, 1970	-0.300	-0.062	-0.651 to 0.050

Note 1

We are attempting to predict Telex's rate of return for each of two months assuming Briloff's remarks had *not* been made, following the framework expressed in equation (3). As stated there (p. 9), 'a court might require a specific probability (say, .95) that the actual return was less than it would have been in the absence of [Briloff's remarks] before even considering the amount of damage'. That is, the court might require $P[(R_{Tt}/R_{mt}, e_{It}, I_{Tt}) > \text{actual return}] \geq 0.95$. The 'classical' statistical approach shown in Table 1 does not allow for such a probability statement. However, a Bayesian statistical approach, using the predictive distribution for the next observation, does allow for such a probability statement.²⁵ Thus, for May, 1970, $P[(R_{Tt}/R_{mt}, e_{It}, I_{Tt}) > -0.294] = 0.44$. For June, 1970, $P[(R_{Tt}/R_{mt}, e_{It}, I_{Tt}) > -0.062] = 0.12$. Thus, for both months the probability that Telex's actual rate of return was less than it otherwise would have been in the absence of Briloff's remarks is much below the hypothetically required 0.95.

Note 2.

95% confidence intervals were also constructed for the three additional models noted in the footnote to Table 1. In all cases, these confidence intervals included Telex's actual rate of return for both months under investigation.

Telex to make public some favourable information that had previously been private.

A third result concerns the significance of each of the three independent variables. The most widely cited explanatory factor in assessing individual security returns, the market movement, is the least significant independent variable.²⁵ Both the industry returns and the unexpected earnings variable were significantly different from zero at the .06 level or better. Furthermore, both variables had negative values during May and June, 1970. Ignoring these two variables could lead to erroneous conclusions concerning the extent to which Telex's stock suffered an abnormal drop in price.

Overall, the results using monthly data would tend to weaken Telex's case. We turn now to a look at the several individual events.

Methodology—Individual Events—Daily Data

The following time line identifies the firm specific events that occurred during the Telex/Briloff episode,

based on a search of the *Wall Street Journal Index* and *Barron's*.

5/11	5/20	5/27	6/15
Briloff article in <i>Barron's</i>	Telex's Annual Earnings published in <i>Wall Street Journal</i>	Telex files suit	Telex withdraws suit and <i>Barron's</i> and Briloff publish retractions

The following model was estimated over 84 trading days ending 11 trading days prior to May 11, 1970:

$$R_{Tt} = a + b R_{mt} + b' e_{It} + v_t \quad (8)$$

where

R_{Tt} ≡ rate of return on Telex's stock on day t ,
 R_{mt} ≡ daily rate of return of a value-weighted index of NYSE and ASE securities,

e_{It} ≡ daily rate of return of a value weighted index of Telex's industry, not captured by R_{mt} ,

a, b, b' = estimated regression parameters,
 v_t = error term.

²⁵This is true in both a multiple and simple regression context. See Note to Table 1.

²⁶Pankoff, Lyn D., 'Elementary Bayesian Statistics,' Manuscript, Washington University, 1977.

The regression parameters estimated using equation (8) were used to forecast expected daily returns for the period beginning 10 trading days

prior to Briloff's article through 10 trading days after the retraction, for a total of 46 trading days. Two 'event periods' were defined: (1) each day and (2) the entire 46 day period. For each day in the event period a t -statistic was computed:

$$t = \frac{v_i}{s(v)} \quad (9)$$

where $s(v) \equiv$ standard error of the regression residuals.

For the entire period, we have:

$$t_{\text{total}} = \frac{1}{46} \sum_{i=1}^{46} v_i \quad (10)$$

Results—Daily Data

The results using daily data are exhibited in Tables 3 and 4. They are summarised below.

Telex's abnormal stock return was -21% on the day of the publication of Briloff's article (t significant at .0001), which reduced Telex's cumu-

Table 3
Daily Data

Day	Abnormal Return	t	CAR	Dates
-10	0.0063	0.159	0.0063	
-9	0.0406	1.021	0.0469	
-8	0.0572	1.439	0.1041	
-7	-0.0155	-0.389	0.0886	
-6	-0.0127	-0.321	0.0759	
-5	-0.0540	-1.360	0.0219	
-4	-0.0072	-0.181	0.0147	
-3	0.0367	0.923	0.0514	
-2	0.0259	0.651	0.0773	
-1	0.0040	0.100	0.0813	
0	-0.2140	-5.387	-0.1327	5/11/70
+1	0.0225	0.565	-0.1102	
+2	0.0042	0.107	-0.1060	
+3	0.0618	1.556	-0.0442	
+4	0.0551	1.388	0.0109	
+5	-0.0585	-1.474	-0.0476	
+6	0.0040	0.102	-0.0436	
+7	0.0681	1.714	0.0245	5/20/70
+8	0.0504	1.270	0.0749	
+9	-0.1446	-3.640	-0.0697	
+10	-0.0458	-1.153	-0.1155	
+11	0.0510	1.284	-0.0645	
+12	0.1053	2.651	0.0408	5/27/70
+13	-0.0199	-0.501	0.0209	
+14	-0.0144	-0.364	0.0065	
+15	0.0095	0.238	0.0150	
+16	0.0348	0.875	0.0508	
+17	0.0199	0.502	0.0707	
+18	-0.0568	-1.430	0.0139	
+19	0.0342	0.861	0.0481	
+20	0.0100	0.252	0.0581	
+21	0.0199	0.500	0.0780	
+22	0.0193	0.486	0.0973	
+23	-0.0146	-0.369	0.0827	
+24	0.0064	0.160	0.0891	
+25	0.0160	0.402	0.1051	6/15/70
+26	0.0335	0.844	0.1386	
+27	-0.0123	-0.309	0.1263	
+28	0.0081	0.203	0.1344	
+29	0.0376	0.946	0.1720	
+30	-0.0107	-0.270	0.1613	
+31	-0.1161	-2.924	0.0452	
+32	0.0951	2.395	0.1403	
+33	0.0452	1.139	0.1855	
+34	-0.0573	-1.443	0.1282	
+35	0.0356	0.897	0.1638	

Table 4
Overall Results—Daily Data

	<i>Estimation Period</i>	<i>Event Period</i>
Average Abnormal Return	—0—	0.0036
Standard Deviation	0.0397	0.0578
N	84	46
t*	0.372	
DF	69	
p-value	0.71	

*Approximate t calculated with an adjustment for unequal sample sizes and sample variances.

lative abnormal returns (CARs) to a negative 13%. Within four trading days, however, the CAR had climbed back to +1%, indicating that Telex stockholders had earned (slightly above) the risk adjusted rate of return over the 15 day period surrounding the publication.

There were large, positive (but not statistically significant) abnormal returns accompanying the announcement of Telex's annual earnings, followed immediately by another sharp decline. Thus 3 trading days after the announcement of earnings, Telex's cumulative abnormal returns (CARs) were still negative by an amount almost as large as on the date of the publication of Briloff's article.

From that point on, however, a positive trend became dominant. Associated initially with the filing of Telex's suit, the CARs grew to a positive 10.5% on the date of the retraction and withdrawal of the suit and were higher still on the tenth day following the retraction.

Finally, the *t*-statistic for the entire period, testing to determine whether average event period abnormal returns were below zero, was not statistically significant and, in fact, indicated a positive value.

Hence, while these daily data suggest a sharp decline in Telex's rate of return associated with Briloff's article, that negative effect persisted only a few trading days. There was a net drop again surrounding the earnings announcement about which Briloff had provided warnings. But again the negative effect evaporated rather quickly and overall the effect was slightly positive.

Limitations and discussion

The results using daily and monthly data are remarkably similar. Both indicate an initial decline associated with Briloff's article, but that decline was short-lived. Damages may have occurred in some sense at the time of publication, but only those who sold their securities prior to the turnaround sustained any permanent damage.

Since the burden of proof rests on those claiming damages to demonstrate the existence of damages,

given all relevant variables, if monthly estimates of unexpected income are the most reasonable available, then monthly returns are relevant measures of damages for the defendant to use in casting doubt on the existence of damages. The use of daily returns, therefore, that does not control for unexpected earnings changes might not satisfy the burden of proof requirement, because omission of such a potentially important factor would leave a gap in the plaintiff's case, and create an opportunity for the defendant to raise doubts in the mind of the court. The similarity of the results using daily and monthly data, however, suggest only one methodology need be used.

A potential limitation of the approach used in this analysis is that it takes an essentially single-security perspective. The effect of that perspective is to focus on returns (i.e., price changes) as the only relevant variable affecting potential damages. From a portfolio context other variables (e.g., risk) might be as important, because events that affect a security's risk could inflict damage to investors without necessarily affecting returns. For example, a change in a security's systematic risk might force portfolio revision, additional transactions costs, and/or a movement away from an investor's preferred risk-return position, without being perceptible at a given point in time.

This single-security, return oriented approach was selected primarily because it was the basis of damage claims in the past. There are no known cases of damages being claimed because of unjustified changes in systematic risk.

In addition, changes in systematic risk cannot be observed quickly after a particular event occurs. Rather, a series of observations is needed to establish a new relationship between firm and market returns. Consequently, Telex, by filing suit so quickly after Briloff's article, must have been focusing on returns rather than risk. However, consideration of the portfolio perspective in assessing liability and damages in a general sense would possibly be a fruitful area for future research.

Subject to the inherent problems of isolating 'best' earnings expectations models, etc., when

monthly data are used, the implications of market efficiency ought to be considered in assessing liability and damages. In fact, whenever the timing of an event can be specifically identified, the effect of that

event on a firm or firms should not be assessed without considering the reaction of the market and controlling for other variables that might explain that reaction.

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Book Reviews

Bond Duration and Immunization: Early Developments and Recent Contributions. *Gabriel A. Hawawini (ed.)*. Garland Publishing, Inc, 1982. Approx. 400 pages (not consecutively numbered). US\$42.

The term 'bond duration' in the title refers to a concept first presented by F. R. Macaulay in 1938. Bond duration is defined as the weighted average period of time which will elapse before the cash flows from the bond are received, where the weights used are the present values of the individual cash flows expressed as a fraction of the total present value of the bond.

A numerical illustration may help to clarify this definition. Consider a bond worth £95.20 which is expected to pay £10 at the end of each of the next two years and £110 at the end of the third year. To find its duration, one must first establish the rate of return from the bond; in this example, it is found to be 12% p.a. The present values of each payment are then calculated. The present value of the first payment is $£10/1.12 = £8.93$, that of the second payment $£10/(1.12)^2 = £7.97$, and that of the third payment $£110/(1.12)^3 = £78.30$. Expressing those present values as fractions of the value of the bond, we obtain weights of 0.0938, 0.0837 and 0.8225, respectively, to be attached to the intervals which must elapse before the cash inflows occur. Using those weights, the duration of the bond is now found:

$$\begin{aligned} \text{Duration} &= 1 \times 0.0938 + 2 \times 0.0837 \\ &\quad + 3 \times 0.8225 \\ &= 2.729 \text{ years.} \end{aligned}$$

An important property of bond duration is that it represents a measure of the sensitivity of the bond price to changes in the market rate of interest: the longer the duration of a bond, the more volatile will its price be in response to a given change in the interest rate. Specifically, duration is numerically equal to the elasticity of bond value with respect to the discount ratio $i/(1+i)$. It is therefore a useful tool for assessing the risk associated with the holding of bonds.

In theory, the holder of a portfolio of bonds might be able to eliminate all risk other than that of default by matching the timing of his future receipts exactly to that of his future cash needs. In practice, however, this is impossible to implement. A mismatch in time between cash inflows and cash needs gives rise to risk of two kinds. Where the inflow occurs before the cash need, there will be

a risk associated with the reinvestment rate: the interest rate at which the cash can be reinvested until required may differ from that which had been expected. Where the inflow occurs after the cash need, there will be a risk associated with the market price of the bond: the price realised on selling the bond may differ from that which the investor had expected to obtain. For a given change in the market rate of interest, these risks will be in opposite directions: an increase in the interest rate will have a favourable effect on reinvestment opportunities but an unfavourable effect on realisation proceeds, and vice versa. It can be shown that these opposing risks are perfectly balanced (i.e., that the investor's position is perfectly hedged) when the mean duration of the investments is set equal to the mean term of the liabilities which the investments are required to satisfy. This hedging rule was first demonstrated by Paul Samuelson in 1947; the name 'immunisation' was given to it in 1952 by the British actuary F. M. Redington.

The concepts of duration and immunisation have been extensively used in economics, finance and insurance, and the book consists largely of readings reproduced from the literature of those three areas. The editor has contributed 16 pages of introduction, a mathematical note, and a classified bibliography of 103 items.

The bibliography lists three articles under the heading 'Duration and Capital Budgeting', but none of these is included in the book. An accountant without special interests in finance or actuarial science might wish to turn to those articles before tackling Hawawini's book. The two more accessible articles are: J. Whittaker, 'The relevance of duration', *Journal of Business Finance*, Spring 1970 and E. Blocher and C. Stickney, 'Duration and risk assessments in capital budgeting', *Accounting Review*, January 1979.

The University of Melbourne

F. K. Wright

Who's Who in Economics: A Biographical Dictionary of Major Economists 1700-1981. *Mark Blaug and Paul Sturges (eds)*. Wheatsheaf Books, 1983. xiv + 435 pp. £50.00.

When two or more economists are gathered together, the discussion often centres more on other economists than it does on economics. Perhaps the

same is true of other professions. Perhaps also such discussion provides a useful motivation to the development of the subject. As one anonymous wit put it: 'I will not go so far as to say that English economists have lived by taking in one another's washing, but it is certainly true that they have spent a vast amount of time mangling one another's theories.'

This book provides a great deal of material of interest, and not only to economists. It is also a very useful reference work, providing a clear guide to major economists and their contributions to the subject. A typical entry includes current and most previous posts, major fields of interest, a statement of principal contributions to economics and chief publications. The entries for living economists were written by themselves, and those for dead economists were written by the editors on the basis of standard sources. Other features of this book include an index of major fields of interest and two country indices, one by place of birth and the other by place of residence.

In any *Who's Who* compilation the first problem, of course, is who should be included and who, by implication, should not. Blanket coverage is clearly out of the question, even if the editors were not restricting themselves to major economists. There are about 13,000 economists who publish in academic journals. Under other definitions of an economist, the number may be as high as 17,000 in the United States alone. Every definition has its limitations. However, for living economists, the editors chose the frequency with which individuals have been cited, as revealed by the *Social Sciences Citation Index*.

The next problem is where to stop. Where is the dividing line between 'major' and presumably what must be 'minor' economists? As far as the citations criterion is concerned, the editors stopped at 640 entries on the grounds that the senior editor 'appeared as the 641st most frequently cited living economist in the years 1970-80.' However, the editors also added 'a sprinkling of other names whose works may be rarely cited but whose achievements in advice to policy-makers in business and government are generally recognised by their peers' (p. viii). This produced a total of 674 living economists. In addition, the careers of 397 dead economists are included. These were selected 'by a critical comparison of the names appearing in the indices of leading histories of economic thought'.

Any reference work like this one is inevitably an easy target for the slings and arrows of outrageous nitpickers. Different readers have different needs and no compiler could ever be expected to satisfy them all. Nevertheless, one or two suggestions might be made. While it is clearly sensible to allocate roughly equal space to living economists, no such constraint applies to deceased authors. In

such a reference work, individuals such as Keynes and Marx merit more than one and a half columns in the first case, and only just over a column in the second. Naturally shortage of space is a serious constraint, but perhaps the material justifies a larger volume. This raises a second point regarding coverage. Under the citations criterion, the editors stopped at 640 economists on the somewhat modest ground that the senior editor was next in line. Many economists would consider that the 641st, and quite a few others, should have been included. Furthermore there may be scope for a much wider work. Most individuals who deal with economists are more likely to come across a 'minor' rather than a 'major' one. No doubt *A Biographical Dictionary of Minor Economists* would not be the right title for a sequel, but as the editors envisage a second edition in the mid-1980s which will extend the coverage of names, this may well go a long way to meeting this point.

Such nitpicking aside, this is a valuable reference work for anyone with an interest in economics and economists.

University of Exeter

Simon James

Professors of Accounting at the University of Edinburgh: A Selection of Writings, 1919-83. Thomas A. Lee (ed). Department of Accounting and Business Method, University of Edinburgh, 1983. c. 100 pp. £3.

As everyone knows, the University of Edinburgh became four hundred years old in 1983. Professor Lee has had the happy idea of publishing this book as a birthday token from the department of accounting.

It contains an article by each of the seven men who have held the chair in accounting—Laird (1919-27), Annan (1927-45), Murray (1945-57), Anderson (1958-66), Stamp (1967-71), Whittington (1972-5), and Lee (still going strong). Each article is prefaced by a short biography.

Some of them scarcely seem likely to set the Forth on fire, but the collection serves a useful purpose. It reminds us of important stages in accounting education. Scottish CAs showed themselves both enlightened and shrewd when (just after World War I) they persuaded the universities of the three big cities to teach their apprentices. This arrangement—and its later adaptations—gave the Scots an educational lead that they still enjoy.

It used to be thought that professors of accounting should be practical men. So the first four at Edinburgh were part-timers (and without degrees). Typically they taught from 9 till 10 am and then



drove off to a day's work in their New Town offices; sometimes they had to go back to senate meetings in the afternoon; and after supper they presumably drafted lectures and examination papers, did their reading, and then thought about research.

What made them shoulder the burden of two jobs? The university's pre-war pay was about £700 a year. While this was generous by academic standards (a full-time professor got £900), it would hardly be decisive for a partner in a flourishing firm. The professor whom I knew best, and admired most, was Annan; I think he was prompted by both sense of duty and liking for the academic atmosphere.

The seven papers could serve as ammunition for both sides in a debate on full- versus part-time teaching. The first four are by the part-timers. Laird's, on investigations, is down-to-earth matter that could still help students. The other three are largely pleas for more and better accounting. Annan's inaugural lecture (which, as a respectful apprentice, I went to hear) tells a good deal about contemporary opinion. He wanted more disclosure in the balance sheet, but not in the profit and loss account (where 'the particulars given would be partial only, and consequently misleading, and without standardisation these would be useless for comparison with the accounts of similar concerns'). In support of costing, he quotes 'England is still conspicuous for small-scale enterprise with its innumerable isolated manufacturing concerns with traditional-rotten methods and inefficient costing systems, each jealously guarding as knowledge beyond price the details of its antiquated system'. He reinforces his plea by citing the bankruptcy of another Edinburgh man: 'Sir Walter Scott, through misplaced confidence in a master printer who did not know his costs, became liable for debts amounting to no less than £130,000' and then, rather than lose his spurs in a Court of Honour, made himself 'a vassal for life' to his creditors.

The last three papers, by the new breed of full-time professors, are strikingly different in content. Stamp's is on accounting principles, and contains his tentative plea for an 'accounting court'. Whittington's is on 'Directors' Pay, Growth and Profitability', and shows admirably the shift to statistical method. And Lee ends on a high note with his Edinburgh Taxi Company, a well-illustrated plea for cash flow accounts.

London School of
Economics

W. T. Baxter

An Introduction to Merchandise. Robert Hamilton. Garland Publishing, 1982. US\$25. **The American**

Accomptant. Chauncey Lee. Garland Publishing, 1982. US\$30.

Included in the Garland Series 'Accountancy in Transition' edited by Richard Brief are reprints of the bookkeeping sections of the second edition of Hamilton's *An Introduction to Merchandise* published in Edinburgh in 1788 and Lee's *The American Accomptant* published in Lansingburgh, NY in 1797. Both are of interest to accounting historians although for quite different reasons.

Robert Hamilton, LLD, FRSE (1743–1829) is the most interesting writer in English on accounting between the pioneering authors on double entry bookkeeping of the 16th century and the beginning of a modern accountancy literature in the last two decades of the 19th century. He wrote the first edition of *Merchandise* in 1777 when rector of Perth Academy. He became professor of natural philosophy in the Marischal College, Aberdeen in 1779, moving later to the chair of mathematics. His ornate tomb can easily be found by interested tourists.

Hamilton's book anticipates later thought and practice in several ways. In a note reprinted from *The Accounting Historian* and prefaced to the reproduction Professor Yamey draws attention to Hamilton's discussion of costs and business decisions. Hamilton is also notable for recommending the valuation of goods at replacement cost: 'such a value as the owner would be willing at present to buy for' (p. 285).

Most of his book, however, is more representative of its date of publication. For example, merchants are recommended not to write off 'desperate debts' but to collect them in a bad debts account (a balance sheet item) which 'although it introduces the amount of these debts as an article of your stock [i.e. assets] at the general balance, no great inconvenience follows; because the title by which they are distinguished must lead you to make the proper estimate' (p. 334).

The long title of Lee's book is *The American Accomptant; being a Plain, Practical and Systematic Compendium of Federal Arithmetic; in Three Parts: Designed for the Use of Schools, and Specially Calculated for the Commercial Meridian of the United States of America*. It is of interest not for its bookkeeping section, which is brief and greatly inferior to that in Hamilton, but for what it tells us about the American economy of the time. A fair amount of space is devoted to the many different currencies circulating in the newly United States and their relationship to 'Federal Money'. The frontispiece illustrates coins from the USA, Spain, France, Portugal and Britain. There is a plea for decimalisation not only of the currency (which had just been achieved) but also of weights and measures. The book is full of the hideously complicated calculations made necessary by the

numerous currencies and measurement systems then simultaneously in use.

University of Exeter

R. H. Parker

Financial Accounting Theory and Standards. *M. Harvey and F. Keer.* Prentice-Hall International, 2nd Edition, 1983. x + 214 pp. £6.95.

The second edition of this book, first published in 1978, has been substantially revised by the authors. Chapters 1 and 8 have been rewritten in an effort to make clearer the links between theoretical ideas and accounting standard setting. The coverage given to the contents of standards has been extended. A chapter on stock valuation has been included and coverage of the price level accounting issue has been allocated an additional chapter.

The aim of seeking to introduce students and practitioners to theoretical ideas with which to appraise accounting standards is a commendable one. However, it can be argued that the authors might better have served their readers by focussing on an alternative theoretical paradigm and by integrating a good deal of the Chapter 8 material into the first scene-setting chapter. In Chapter 1, the authors adopt a traditional theoretical view contrasting the inductive with the deductive approach to theory construction, and focus attention on the issue of reality of assumptions versus the oretical predictive power. This approach seems of limited usefulness as no implications are derived to allow insights to be drawn regarding the selection of accounting policy alternatives for inclusion in standards. In particular, in the following chapters the reader is repeatedly presented with the puzzle of a wide variety of accounting alternatives, a diversity of users' needs and the absence of a conceptual framework to bring about a satisfactory reconciliation. On this foundation is then based a comprehensive description of the contents of various accounting standards.

Were the material from Chapter 8 on users of accounts and their needs to be included in Chapter 1, and the theoretical framework provided by information economics (now readily available in Beaver (1981)) utilised, the authors might have clarified important issues for their readers. It could then be shown that, given diversity of user needs, standard setters cannot hope to be able to identify any particular accounting policy from among accounting alternatives which will fully satisfy the needs of different user groups. Similarly the Chapter 8 discussion on the merits of disclosure could have been more enlightening if addressed within an information perspective. Results on the effect of different disclosure practices on the distribution of

income and wealth could then be introduced. Also, the potential of different disclosure policies as cost effective means of conveying information could usefully have been explored.

Notwithstanding the above remarks, the authors are to be complimented on their effort in relating the Fisherian and Hicksian theories of income measurement to actual income reporting practices—it would have been useful were this exercise extended beyond consideration of income concept number one to include those of concepts two and three. The material describing the Edwards and Bell (1961) approach could have been more accurate—and deserved to be fully integrated in the text. It is disputable that Edwards and Bell '... obviously had a profound influence on the thinking of the Accounting Standards Committee in their preparation of SSAP16' (p.38). Godley and Cripps (1975) deserve more of the credit for the peculiarities of that standard.

The desire to incorporate a full account of the content of certain accounting standards, dictated perhaps by an eye to marketing for professional examination students, limits the effectiveness of this book. This is a pity, as it is important that such an audience understand what standards might hope to achieve—and what is beyond their attainment. The suggestion made here for the adoption of an information economics framework is no more than placing in an accounting context the principles of economic analysis with which all professional accountancy bodies require their students to be familiar.

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University of Bristol

J. J. Forker

Chips in Industry, *A. E. Owen.* Economist Intelligence Unit, 1982. 139 pp. £75.

In May 1983, Parliament's Industry and Trade Committee published a report on Machine Tools and Robotics. It saw no future for British industry unless it switched to computer controlled tools and robots. By December 1982 Britain's robot population was 1,152, fewer than in Sweden, Germany or the USA, and only a fraction of the Japanese total of 13,000. Worse still, of that low level of installation the proportion of *British* manufacture

was declining, with catastrophic implications for the domestic machine tool industry whose conventional medium and low technology products are either obsolete or uncompetitive in their third world markets.

The parliamentary report cites evidence of inadequacies in many fields—education and training, marketing and investment. In *Chips in Industry*, A. E. Owen, telling the same woeful tale, concentrates his fire on accountants, saying 'One of the fundamental reasons that microelectronics in general and robots in particular are not being adopted in greater numbers (in the UK) is the communication and understanding gap that exists between accountants and engineers.' He sees the crux of the problem as the accountants' failure to recognise that cost benefits can come from sources other than the reduction in manpower. Analysis of the conversion sector, the point at which value is being added, shows that material is being worked on for only 1.5% of the time it is in the factory. Where the industrial process is assembly, the materials are being worked on for over half their factory time, but only a tenth of that is in assembly, most of it is in transport. For a 'typical' product, labour and overheads together account for less than half the factory costs, over half being for materials and components. He cites an estimate of £17,842 million locked up in stock and work in progress in 1980.

The first half of this book shows the scope for cutting costs by increasing efficiency in every department. For management tasks such as forecasting, stock and production control and inventory management, adequate software packages exist, and no advanced computer skills are required in order to use them. The time and effort involved in design, especially draughting, can be cut to a fraction. Top quality inspection with microelectronics at every stage of manufacture will increase reliability and cut the cost of failure—87 per cent of the money spent by UK companies on achieving quality goes not on preventing failure but on paying for it. Computer controlled warehouses, of which the Japanese have about 2,000, the British some 100, provide high density stacking combined with 'maps' of all goods installed, eliminating goods mislaid by human error. For maintenance, cheap monitoring of plant and machinery together with computer records and analysis enable breakdowns to be averted, repairs and renewals timed for optimum economic return. He explains the uses, present and potential, of robots, and lists their makers.

The second half of the book explores future developments, particularly, the prospects for fully automated 'flexible manufacturing systems', such as the experimental SCAMP system (Six Hundred Computer Aided Manufacturing Project) which is reducing typical throughput time from 8 weeks to

3 days. Experimental robots that see, smell, respond to speech, may even be activated by human brainwaves, perhaps offer some comfort for British tardiness, emphasising the scope yet remaining for innovation and installation—but time is not on our side. A witness to the Parliamentary Committee gave the machine tool industry five years in which to change or die.

The social and political implications are obviously immense, and it is all the more significant that the AUEW, in their evidence to the Parliamentary Committee, recognised that there was no alternative to robots, that the choice lay between a diminished or a destroyed workforce. *Chips in Industry* in its closing pages has a not very searching stab at these issues, but it is not here that its strength and value lie. This is a practical stimulus and guide to firms of every size on how microelectronics can improve their performance and at what cost. It does not explain the fairly extensive Government help available—but the details are in any case subject to revision. It should be required reading and it is all the more pity that the high price may limit its availability, for an informed response to the issues it raises is likely to prove crucial to the future of British industry.

University of Exeter

Anne Glyn-Jones

Accounting Principles Through The Years. Stephen A. Zeff (ed.). Garland, 1982. US\$60.

Garland has now taken over from Arno as the publisher (or, rather, re-publisher) of old writings that illuminate accounting history. Fortunately Professor Dick Brief has also been taken over as editor of the series.

In his introduction to this book, Professor Zeff tells us that, from 1938 to 1954, the American Institute of Accountants devoted some part of its yearly meetings to research problems; it published the papers in special volumes that now are hard to find. Accordingly he has picked out some of the more interesting papers, and put them—by photocopying—into this book.

The table of contents bristles with famous names—George O. May, Henry Rand Hatfield, William A. Paton, and many others. The articles number over seventy. This means that most of them are short (some run for only one or two pages). They should perhaps be regarded, not as original contributions to accounting thought, but rather as running commentary on those contributions.

Thus the 1938 papers consisted of eleven comments on the Hatfield-Sanders-Moore *Statement of Accounting Principles*. Each speaker discussed one

section of the *Statement*; for instance, Paul Grady dealt with depreciation (in only three pages). Perhaps Walter A. Staub's paper on uniformity will some day be looked on as a long step in the march towards Standards, particularly as it is followed by a lawyer's plea for the 'crystalization' of accounting principles: accountants ought to set up a board of accounting appeals, coax state legislatures into enacting a 'uniform law of accounting', and issue a restatement of principles, rules, and procedures. 'The entire law of contracts was completely restated in the American Law Institute and definitively published in an over-all period of less than nine years. There is no reason to suppose that the preparation of a restatement of accounting should take as long.' Well, well . . . maybe law and accounting are different.

The topics chosen for successive years may to some extent show how accounting thought was shifting and developing. The early papers are largely concerned with bread-and-butter affairs—e.g. LIFO, depreciation, 'what is cost?', and fixed asset valuation. The 1943 papers switched to wartime problems. Inflation accounting appeared briefly in 1948, when three papers gave the viewpoints of the accountant, the manager, and the economist. (The last is a forthright attack on historical cost by Professor Solomon Fabricant, who had already mastered a problem that was still to baffle the rest of us for many years; he quotes from *Alice*, and accuses accountants of basing their statements on 'heterotemporal' prices.) 1953 brought direct costing, and GAAP followed.

In 1944 there were six papers on what now seems a somewhat arcane topic—'Historical versus Earning Power Concept of the Income Statement.' Apparently 'historical' described the reports of the small firms typical of earlier times. In those reports, the income statement played second fiddle to the balance sheet; and even the latter was used only by bankers (looking for quick or 'pounce' items). Every kind of realised loss and gain was bundled into the income statement, and 'there were no fine spun theories of earning power, earnings per share, extraordinary and non-recurring charges'. Then, as the outside investor grew important, the income statement gained superior status (to an extent that now seems unfortunate). It was expected to show the firm's ability to earn from normal activities; so (the speakers argued) there should be a logical segregation of less usual items, and sufficient explanation to satisfy analysts interested in the present and future as well as the past. As a corollary, the statement should yield a useful 'earnings per share'. G. O. May thundered against this statistic: 'a satisfying yardstick in the form of a single figure of earnings per share is merely an objective of wishful thinking'; the accounting profession and the SEC should jointly prevent its publication. But,

as we all know, the tide was running too strongly, and here the great man did not get his way.

London School
of Economics

W. T. Baxter

Managing the Water Industry: The Accounting, Reporting and Auditing Dimension. E. McL. Holmes. Public Bodies Review Committee, Parliament of Victoria, Australia, 1982. xi + 237 pp. A\$6.90.

Although this report focuses on the water industry in the Australian State of Victoria, many of the problems described are similar to those experienced in the control and accountability of state enterprises in the United Kingdom and, no doubt, in many other countries. Also many of the detailed prescriptions developed in the report are capable of being applied, sometimes after modification, to enhance the control and accountability of state enterprises elsewhere.

The report has nine chapters. The introductory chapter argues that public sectors are 'out of control' and supports this contention with quotations from Canada, the United Kingdom and New South Wales, as well as from Victoria. The public sector in Victoria is criticised for excessive legislative and regulatory complexity and for the absence of adequate planning, budgeting, recording, reporting and auditing mechanisms. These criticisms were partly derived from a research report by Touche Ross Services Pty, entitled 'A Study of the Audit and Reporting Responsibilities of Public Bodies in Victoria', which was published by the Public Bodies Review Committee in 1981. The terms of reference for the present report were to take the general recommendations of that Touche Ross report and to apply them to the water industry.

Chapter 2 provides a summary of the present report's purposes and proposals. Chapter 3 deals with legal issues. The general approach adopted is that legislation should only be used for broad enduring issues because of the difficulty of making changes to statutes. The more detailed operating requirements should be dealt with through directions, guidelines and advisory statements. Chapter 4 adopts the 'arms length' philosophy to distinguish between the responsibilities of the Minister, the Permanent Head of the Ministry of Water Supply and the management board.

Chapter 5 develops the accounting and reporting prescriptions. An operating statement, a funds statement, a performance report and a balance sheet should be published. For the first three of these statements four dimensions of data should be provided: budgeted information for the forth-

coming year, budgeted and actual information for the current year and actual information for the prior year. The purpose of the performance report is to focus management's attention on objectives, but there is little discussion of the difficulties of developing output-oriented performance indicators that are relevant to the needs of users. To enable the Ministry to prepare consolidated financial statements for the water industry as a whole, management boards should adopt a common balance sheet date, make consistent choices of accounting policies, report in a standardised format and adhere to reporting deadlines.

Recommendations on auditing are dealt with in Chapter 6. It is recommended that a financial and compliance audit and a performance report audit be carried out annually. The forecast financial and non-financial information included in the financial statements and in the performance report should be reviewed by the auditor. In addition, an efficiency and effectiveness audit is to be carried out triennially. A distinction is made between the internally-oriented efficiency and effectiveness management improvement review function and the externally-oriented efficiency and effectiveness public accountability audit function. It is emphasised that it is the latter function which is recommended whose primary objective should be seen as the publication of an opinion on the quality of management. Water board management would be given the right to choose whether the Auditor-General or a private sector auditor carry out each category of audit work, although a private sector auditor would have to be approved by the Auditor-General. In addition, the Auditor-General would have the right to carry out special investigations either on his own initiative or at the request of Parliament.

The last three chapters do not discuss any new issues of substance. Chapter 7 is largely made up of 97 specific legislative proposals which have been developed from the ideas in the report. Chapter 8 develops an implementation strategy, while Chapter 9 provides another summary of recommendations by reproducing key paragraphs from previous chapters.

In the reviewer's opinion the main deficiencies of the report are that:

(1) the usefulness of accrual accounting in this context is not discussed and appears to have been accepted without question;

(2) it is not clear whether the proposed efficiency and effectiveness audits are to include an assessment of the decisions made by management or whether they will be restricted to an investigation of the methods used by management in making these decisions;

(3) in spite of the extensive audit work proposed, there is no mention of the need to investigate whether managers have adhered to the

financial and economic guidelines to be issued by the Permanent Head or whether the systems set up by managers can provide sufficiently reliable and relevant information for that purpose.

In spite of these criticisms the report is a reasonable and brave attempt to resolve some of the difficult problems encountered in attempting to make state enterprises accountable for their performance.

University of Strathclyde

W. M. McInnes

The Financing and Financial Control of Small Enterprise Development. *Graham H. Ray & Patrick J. Hutchinson.* Gower, 1983, xi + 141 pp. £3.50.

In terms of small enterprise development the problems of small enterprise are not just a matter of the availability of finance. This observation by the Wilson Committee is one which Graham Ray and Patrick Hutchinson themselves select when writing upon the financing and financial control of small enterprise development. Their book is the outcome of a number of years research into specific aspects of small business finance but also incorporates a most useful review of small business research in general. The advantage of this is that it enables the reader to put their own work and that of other specialists into the context of a wide-ranging area, embracing both statistical studies of small firm financial behaviour based upon company accounts and in-firm behavioural and psychological research.

Ray and Hutchinson's particular contribution, however, lies in their research into the characteristics of a group of small firms which obtained a stock market quotation. Their approach incorporates a dynamic analysis, looking at such firms over a considerable period, and, while relying on conventional analyses of accounting data, supports this with material obtained from in-firm interviews. There are some interesting results to this exercise, some of which have been reported previously in this journal. Clearly the second part of their research, involving in-firm interviews, depends on access which in itself constrains the number of firms available, and, in turn, limits the extent to which multi-variate analysis forming the first part can produce statistically significant associations. This, however, is of lesser consequence than the valuable insights for further research which their approach develops.

The Bath studies embraced final samples of 66 firms, 33 of which grew to obtain a London Stock Exchange quotation between April 1968 and March 1973, and a group of 33 others. The former enjoyed 'supergrowth' in the period up to quota-

tion, while the latter group comprised a matched sample of small firms which did not go public and which were used as a control group. Case study research into six specific companies were employed to build up hypotheses for further testing. The findings to which the cases point and which are more fully supported by the ratio analysis of the main group of firms, were that firms obtaining a market quotation showed a strong upward trend in profitability, not in itself surprising, together with a drop in profitability in the period after quotation. The financial characteristics exhibited by such supergrowth companies are those of very low liquidity and high growth, to an extent comparable with what might be expected for potentially bankrupt firms. Such findings, in themselves, are perhaps to be expected. For amongst the firms investigated by Davis and Yeomans (1974) for a time period corresponding to that selected by Ray and Hutchinson, just over 30 per cent of those issues involving new capital raised indicated in the prospectus that the receipts would be used expressly to reduce outstanding bank overdrafts, mortgages or loans. Again, the work by Singh and Whittington (1968) also suggests that fast growing firms are likely to exhibit similar financing characteristics to the supergrowth firms observed by Ray and Hutchinson. The interesting question which this prompts is how this is managed within the firm, and whether their control systems are very different from those of less successful firms.

The evidence for the supergrowth firms is that from the earliest years a significant number had introduced a subordinate management structure, while in the interviews a vast majority of such firms identified the creation of a team as a crucial factor in their success. But such firms were also led by entrepreneurs whose style of management could be categorised as authoritative and who were supported by an increasingly strong team of subordinate managers. A distinctive feature of such entrepreneurs was their urge to obtain information on both historical and subsequently forecast performance, and their recruitment of specialists is associated with this.

Altogether there is much in this interesting text book which merits careful reading. The value to research lies partly in its review of the work on small firms in general, together with the insights for further development which their own approach suggests.

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- Davis, E. W. and Yeomans, K. E. *Company Finance and the Capital Market* Cambridge University Press, 1974.
Singh, A. and Whittington, G. *Growth, Profitability and Valuation* Cambridge University Press, 1968.

University of Aston

E. W. Davis

The Development of Accounting Theory: Significant Contributors to Accounting Thought in the 20th Century. Michael J. R. Gaffikin and Michael J. Aitken (eds.). Garland Publishing, 1982. 272 pp. US \$40.

This resource book is designed for a course in the development of accounting thought offered at the University of Sydney. It should prove useful for similar courses at other institutions. As most teachers are aware, a major difficulty confronting the student has been the high search cost of tracing relevant critical material bearing on the works studied in the course. Considerable time and effort are often needed to locate book reviews and review articles and as a consequence the attention devoted to the study of the original works is sometimes less than they deserve. Gaffikin and Aitken's volume will therefore be very much appreciated by both teachers and students.

The volume focuses on the major works on accounting theory published in this century by 19 eminent writers. Gaffikin and Aitken have selected the contributions of Sprague, Hatfield, Paton, Canning, Scott, Sweeney, Gilman, MacNeal, May, Vatter, Littleton, Moonitz, Edwards and Bell, Mattessich, Chambers, Ijiri, Sterling and Gambling. One can hardly dispute that it is a roll call of distinguished accounting theorists. My personal idiosyncrasy calls for the inclusion of Bray, Baxter, Mathews and Gynther, to name a few, and no doubt the reader has his or her own preferences.

The treatment of each major work follows a standard pattern. Gaffikin and Aitken provide a biographical note of each writer; a list of the writer's relevant significant publications; a list of references by others to the writer's major work(s) on accounting theory, that is book reviews and review articles; the reproduction of one or more of the book review or review articles; and finally, a set of questions posed by the editors of the volume. Gaffikin also contributes to the volume in the concluding chapter on a methodology for theory appraisal in accounting.

The questions at the end of each section are an interesting feature of the book. Many of the questions are straightforward, and are designed to discover whether students have read and understood the original work and its critics. For example (p. 172):

- (2) E[dwards] & B[ell] distinguish between estimating short-run and long-run profit. For the former the authors favour opportunity cost (defined as market resale price). For the latter they favour current cost.
—What is their basis for this distinction?
—Accepting that the short-run is part of the long-run how justified are E & B in referring to entry prices as being an extension of the theory of exit prices?

Some questions are designed to make students think critically about a particular proposition (p. 138):

- (3) 'Trying to make financial statement figures tell of *value* would not produce a dependable basis for accounting. The data would lose their prior significance every few days' (Pg. 212).
 - If valuations lose their significance every few days how much worse are historical valuations?
 - What does Littleton determine as the significance of valuations?
 - To what extent can Littleton be said to substitute usefulness of information for objectivity of information?
 - Are usefulness and objectivity necessarily substitutes for one another?

More novel, some questions are phrased with tongue in cheek, and invite comment on seeming inconsistencies in an author's work. The first example reproduced below relates to Paton (p. 25) and the second to Canning (p. 44):

- (4) 'In this book, no attempt has been made to discuss the problems of valuation except in so far as the explanation of the structure of accounts has a bearing upon these matters'. (Pg. xvii)
'Valuation is the crux of accountancy' (Pg. 92).
 - Would one be justified in connecting these two statements?
 - If so, what implications do they have for Paton's work?
 - In what sense is valuation the crux of accountancy?

- (1) 'The accountants have no complete philosophical system of thought about income; nor is there evidence that they have greatly felt the need for one' (Pg. 160).

'The accountants can properly be said to adhere to one highly useful and intricately articulated theory (of income)' (Pg. 143)

- To what extent are the above quotes complementary/contradictory?

As one would expect (my intention here is to make a neutral statement), some of the questions lean towards the mode of thought prevailing in the accounting department at Sydney University. The following is a particularly slanted example (p. 87):

- (5) In favouring the cost price of assets to zero values, MacNeal maintained that 'such (referring to zero values) would be farther from

the truth than the use of original cost as value' (Pg. 188).

- To what extent does this and other aspects of MacNeal's book reveal his inability to break away from the value in use notion (as opposed to his ideal value in exchange)?
- What other author(s) suggested zero values for non-marketable assets?

In the interest of even-handedness, I should mention that Professor Chambers too is taken to task, albeit rarely, as in question (2) on p. 204.

The authors' objective is to 'provide a useful resource to stimulate the study of the works of our important accounting theory forbears'. The ultimate test is whether this objective has been attained. Bob Parker and I offered a course on the history of accounting thought at my university about two years ago. We and our students would have benefitted much had this book been available then.

On a minor point, I notice that the Contents page refers to D. R. Scott. Professor Scott, for reasons which appeared eminently sensible to him, preferred to be known as DR Scott. The following communications which appeared in *Accounting Research* (July 1958) may be of interest to some readers:

Your recent article on the late Professor Scott, of the University of Missouri ('Accounting Related to Social Traditions—The Theoretical Formulations of D. R. Scott', by L. J. Benninger, *Accounting Research*, Vol. 9, No. 1, January, 1958, pages 17–30), refers to him as D. R. Scott. When I was corresponding with him about the inclusion of one of his articles in *Studies in Accounting*, I noticed that he in fact wrote his name 'DR Scott', and, feeling that this rather odd arrangement might have some peculiar accounting significance, I ventured to ask him about it.

His reply went as follows:

The peculiarity about my name arises from the fact that the family gave me my father's initial as a given name. The way I write it seemed logical to me when I grew old enough to sign my name.

London

W. T. BAXTER

My article was submitted with 'DR', as Professor Scott used those initials. When the galley proofs arrived I found full stops had been inserted. I attempted to relieve the proofs of them but, as indicated by Professor Baxter, was unsuccessful. Due to this same type of misunderstanding, my guess is that over Scott's lifetime the initials were presented in publica-

tions without full stops only in exceptional instances.

Gainesville, Fla., USA L. J. BENNINGER

University of Ronald Ma
New South Wales

Forerunners of Realizable Values Accounting in Financial Reporting. G. W. Dean and M. C. Wells (eds.). Garland Publishing Inc., 1982. xviii + 320 pp. \$45.

The editors claim that Ray Chambers' theory of Continuously Contemporary Accounting is 'the most elegant, complete and rigorous theory of accounting ever developed' (p. iii). The aim of this collection of articles and extracts from books and law reports is to present some of the threads of the arguments for valuing assets at their realisable values which preceded the publication of *Accounting Evaluation and Economic Behavior*. The anthology draws together from diverse sources—economics (2 entries), engineering (2), taxation (4), the law (3), historical accounting (15) and contemporary accounting (6)—various illustrations of 'manifestations of the wealth perspective and of the unequivocal use of selling price valuations it entails' (p. viii). Not all the items included were published before Chambers' *magnum opus*; four have appeared in print since 1966 and are included as evidence of a continuing and, perhaps, developing interest in 'current cash equivalents' of assets as the basis for financial reporting.

There is a brief editorial comment by Dean and Wells, while F. L. Clarke contributes an introductory article which examines the support provided by the various entries in the anthology for 'the recurrent theme' of selling price values. In Clarke's estimation: 'The papers collected in this book contain numerous messages about market price valuations capable of different interpretations. Many give quite explicit support for the selling price case. Others are incapable of reasonable interpretation other than in support of selling price valuations. And others are not inconsistent with the selling price case' (p. xvi). This is fair comment and, in my view, many of the articles

were either capable of quite different interpretations than those placed on them by Clarke, or had no more than a tenuous connection with the title of the book.

For instance, Clarke claims that an anonymous contributor to *Encyclopaedia of Accounting* (1903) advocates selling price valuations when referring to the need for balance sheets to 'state the assets at their *real* value as a going concern' (p. x). But the full text of the article shows that the writer then goes on to say 'allowance being made for depreciated properties' (p. 49). In this context, it must be remembered that historical references made by accountants to 'real' values invariably meant cost less depreciation rather than the notion of present value or selling price which is more common today. In a similar vein, Clarke quotes Carter (1910) as saying that 'the correct basis of value for assets is their *market value*' (xi), but Carter believed that fixed assets should appear at market value only at the dates of acquisition and disposal, and that, during the interim period, it was proper to report them at cost less depreciation (pp 55 and 65). Articles by Bauer (1913) and Moss (1923) are interesting as early advocacy of the need to base depreciation charges on replacement cost to avoid over-stating profit, but they are not really concerned with reporting realisable values in the balance sheet.

In the distant past, selling prices were a not uncommon method of valuing assets for the purpose of profit measurement and financial reporting, and the literature contains numerous examples of the application of this procedure in the accounts of merchants and manufacturers. Some of the reasons for the rejection of realisable values in favour of historical cost are fairly well understood, but there remains much work to be done in order to produce a comprehensive explanation for this transition which no doubt robbed accounting statements of much of their potential usefulness as a basis for resource allocation decisions. Ray Chambers has done much to encourage a re-assessment of the validity of cost-based accounting information and, despite certain reservations concerning the relevance and significance of some of the articles included, this anthology demonstrates effectively the fact that the main thrust of his ideas is not new.

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Volume 14 No. 54 Spring 1984

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Omitted from the Winter 1983 issue:

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There is a submission fee of £18 (US\$30) for non-subscribers to *Accounting and Business Research*.

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Each table and figure should bear a number and a title and should be referred to in the text. Sources should be clearly stated.

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Footnotes should be used only to avoid interrupting the continuity of the text and should not be used to excess. They should be numbered consecutively throughout the manuscript with superscript arabic numerals. They should not be used in book reviews.

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References should be listed at the end of the paper and referred to in the text, as, for example, (Zeff, 1980). Citations to institutional works should if possible employ acronyms or short titles. If an author's name is mentioned in the text it need not be repeated in the citation, e.g. 'Whittington (1982, p. 6) states ...'

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- Accounting Standards Steering Committee (1975), *The Corporate Report* (1975)
- Edey, H. C. and B. S. Yamey (eds.) (1974), *Debits, Credits, Finance and Profits* (London: Sweet & Maxwell, 1974)
- Lee, T. A. (1983), 'A Note on Users and Uses of Cash Flow Information', *Accounting and Business Research*, Spring 1983.

Style and spelling

Abbreviations should be written as, for example, FASB and not F.A.S.B. Words such as 'realise' should be spelt with an 's' not a 'z'. Single quotation marks should be used, not double.

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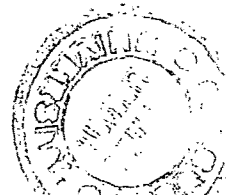
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Forthcoming Articles

Articles which have been accepted but not yet published include those listed below (in alphabetical order by author):

- G. S. Archer and K. V. Peasnell, Current Cost of a Quoted Long-Term Liability. A Comment.
John Arnold and Peter Moizer, Share Appraisal by Investment Analysts. A Comparison of the Techniques Used by Portfolio and Non-Portfolio Managers.
R. K. Ashton, A Statistical Analysis of Decisions in Revenue Cases by the House of Lords.
Paul Barnes, The Effect of a Merger on the Share Price of the Attacker Revisited.
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David J. Williams, Operating Systems Audits. Their Importance and Use.
John M. Wilson, Integer Programming Approaches to Resource Allocation and Profit Budgeting.
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A Survey of the Methods Used by UK Investment Analysts to Appraise Investments in Ordinary Shares

John Arnold and Peter Moizer

Introduction

Surprisingly little evidence exists about the appraisal methods used by UK investment analysts. In this paper we report the results of interview and questionnaire surveys undertaken between 1978 and 1981. The surveys were designed to provide information about the methods used by UK investment analysts to appraise investments in the ordinary shares of companies. The paper is divided into seven sections. The first provides a brief description of our motivation for studying the behaviour of investment analysts and for our choice of research method. The second outlines the results of the interviews we undertook with a variety of investment analysts. The third section deals with the design of the main research instrument—the postal questionnaire—and describes sample selection and response rate. The fourth section summarises the results of the questionnaire survey. The fifth compares some of our results with those obtained in a similar survey by Lee and Tweedie (1981). In the sixth section we comment on our results. The final section contains a brief summary and suggestions for areas in which further research appears worthwhile.

1 Motivation and research methods

Investment analysts are one of the groups of users of corporate accounting reports. They are both investors in their own right and also advisers to other institutional and individual investors. This distinction is important; analysts who invest in their own right, for example as portfolio managers, may have information requirements which differ in some respects from those of analysts who act as advisers to others. The former category of analysts may wish to maximise portfolio return subject to some acceptable level of risk whereas the latter category may wish to persuade their clients to buy and sell securities frequently so as to maximise the commission they receive in respect of purchases and sales. Limitations of space prevent a detailed consideration of the differences between the behaviour of 'investor' and 'adviser' analysts in this

paper. Such an analysis is, however, contained in an associated paper (Moizer and Arnold, 1984). Because of the important role played by investment analysts in the capital market it is of interest to investigate the procedures they follow in making recommendations and decisions concerning the purchase and sale of ordinary shares. Information concerning the behaviour of investment analysts may also be important input to the decision processes of accounting policy makers who have to weigh the competing claims and interests of those affected by the content of accounting reports (including investment analysts).

Having decided that we wished to study the behaviour of investment analysts, we were faced with the problem of choosing a research method. Broadly speaking, two general lines of approach are available. The first—market-based studies—attempts to identify those items of accounting (and other) information which are important in determining the level of, and changes in the level of, the market price of a security. Insofar as investment analysts are participants in the stock market, or influence others who are participants, market-based studies throw some light on the results of the analysts' actions. However, by their nature, market-based studies concentrate on the aggregate market reaction to information and shed little light on the processes by which decisions about share sale or purchase recommendations are reached. For a summary of a section of market-based research see Kaplan (1978) and Beaver (1981, chapters 5 and 6).

The other general line of approach, and the one which we adopt, involves attempting to study individual behaviour at a much lower level of aggregation than is implied by market-based studies. This type of approach has been considerably less popular than market-based research during the past decade or so. Like market-based research, it suffers from methodological difficulties. In addition, the input data required are usually more difficult and expensive to gather, analyse and interpret than is the case for market-based studies. Nevertheless, an attempt to study individual (as

opposed to aggregate) behaviour seems the only way to deal with at least some of the research objectives we outlined above. Furthermore it provides an interesting alternative perspective to that given by market-based research. It may provide a deeper insight into market behaviour, for example the relative importance of different information systems in determining security prices. It may also lead to suggestions for improving the design of accounting reports, for example the disclosure of more (or less) items relating to current costs. In order to gain such knowledge and understanding, the 'black box' of market information processing needs to be opened up and its contents examined in some detail. In view of the scarcity of previous studies of this type relating to UK investment analysts, our objectives in this paper are modest. We attempt to provide a broad description of the procedures used by UK analysts to appraise ordinary shares and to suggest areas in which detailed hypotheses might be formulated for subsequent testing by interviews, questionnaires and other research methods.

There are a number of methods that might be applied to investigate the use of accounting information by individual investment analysts, including postal questionnaire surveys, structured and unstructured interviews, 'laboratory' experiments and structured and unstructured observations. Each has its own strengths and weaknesses, and no single method is likely to be completely successful. Hence a combination of techniques may provide the most useful results, enabling reasonable coverage to be achieved whilst at the same time allowing some in-depth understanding to be obtained. In our study we used unstructured interviews and a postal questionnaire survey.

Before describing our surveys, we consider briefly other research studies which have attempted to investigate the behaviour of individual professional investment analysts in the UK. A study of the US literature is outside the scope of this paper—interested readers will find a number of studies reviewed in Dyckman *et al.* (1978). The evidence concerning UK analysts is extremely sparse. Fitzgerald (1975) conducted a questionnaire and interview survey of 35 stockbroking firms. His study was apparently directed primarily towards testing the effect on market efficiency of stockbrokers dealing in shares on their own behalf prior to the issue of a recommendation to their clients and the media. Firth (1978) sent a questionnaire to 750 individuals including 120 investment analysts employed by stockbrokers and institutions; 46 of these analysts replied. The questionnaire contained 75 items that were, or could have been, disclosed in the Annual Report. Respondents were asked to weight the importance of each item using a five point scale. The results of the survey must be interpreted with some caution as no task

appears to have been specified within which the respondents could judge importance. There may also be some bias resulting from the order of the questions, since the main values of the responses tend to be clustered together.

Perhaps the most comprehensive survey of UK investment analysts is contained in Lee and Tweedie (1981). Using a prepared questionnaire, graduating students interviewed 136 senior investment managers/analysts employed by 79 financial institutions and 95 senior analysts/partners of 61 stockbroking firms. The research was divided into two parts. The first was concerned with determining how thoroughly analysts read information from various sources and how important they believed each information source to be. The second part examined the level of the analysts' understanding of various accounting concepts by asking them to explain what particular items meant. In a later section of this paper we comment on the extent to which our results correspond with those of Lee and Tweedie.

2 Unstructured interviews

Preliminary interviews were undertaken in order to help define the scope and structure of the questionnaire. In addition, they provide some insights which are of themselves of interest. Although the sample of interviewees is small and not strictly random, the results of the interviews provide a pool of data which is, in many ways, richer than that provided by the questionnaire survey; respondents were not restricted either by the nature of the questions asked or by the range of possible answers permitted. The results of the two methods should provide some mutual reinforcement.

Investment analysts in six firms were interviewed. Although this is a fairly small sample, the firms were sufficiently diverse in size and interest to suggest that a reasonable cross-section of investment appraisal techniques would be covered. The sample consisted of two medium sized firms of Manchester stockbrokers, two large London stockbroking firms reported to have different approaches to investment analysis, one very large London insurance company and the main Manchester branch of one of the Big Four clearing banks. All six of the organisations approached indicated their willingness to participate in the research project, which was described to them as being:

designed to identify the decision processes used by stockbrokers and investment analysts when recommending whether or not to buy, hold or sell shares in quoted companies.

The interviews took place in November and December 1978 with between one and three inter-

viewees per interview, all of whom were concerned in some way with the evaluation of ordinary shares.

The interviews were conducted on an unstructured basis, starting with a request to the interviewees to describe the procedures that they would follow when appraising an ordinary share. A definite, conscious attempt was made not to lead the respondents in the course of the interviews, nor to express any opinions on statements by them. When any prompting seemed necessary, it was kept to a minimum, being used only to develop ideas generated by the interviewees. Fortunately, the conversations tended to proceed along similar paths, largely because the share appraisal techniques being described tended to follow the same general pattern as we describe below.

The principal share appraisal technique used by all interviewees was fundamental analysis. None of those interviewed mentioned that they used technical analysis, in the sense that they examined charts (i.e. graphs of share price against time) in order to spot various patterns or to identify particular resistance levels. However, the respondents did reveal that they compared graphs of market price, price-earnings ratio and dividend yield for the company being appraised with the corresponding plots for the Financial Times All Share Index, thus indicating that they were perhaps using some of the principles of technical analysis. None of the firms interviewed used beta analysis. One stockbroking analyst remarked that, even though she had studied the capital asset pricing model as part of her business studies course, she had never used it in practice. Another indicated that whilst other people in his firm might use betas in the evaluation of portfolio performance, betas were not used as part of the firm's normal share appraisal procedures. In view of the prominent position enjoyed by beta analysis/modern portfolio theory in the academic accounting and finance literature during the past decade or so, this lack of enthusiasm amongst practising analysts is perhaps surprising. We discuss this point further in our analysis of the questionnaire results, which confirm the impression given by the interviews.

The form of fundamental analysis practised by all the interviewees followed the same general pattern, although there were considerable differences of emphasis. The common general pattern involved attempts to predict a company's share price at some time in the future, usually not more than one year ahead. Most frequently, this prediction involved estimating earnings for the current year and applying an 'appropriate' price-earnings ratio to the estimated earnings in order to predict future market price. Predicted market price was then compared to the current market price to see if the share looked currently over- or undervalued. The main apparent differences between the

approaches adopted by the six firms interviewed arose with respect to the procedures followed for estimating earnings. Most of the firms used the same broad approach to the selection of an appropriate price-earnings ratio. The analysts considered the company's balance sheet, giving particular emphasis to the company's liquidity position and gearing ratio, and the view of the company taken by the market over the preceding few years. Such market sentiment is affected by the 'quality' of the company's earnings, i.e., whether or not there has traditionally been a steady growth in earnings per share and thus a stable earnings stream, which would be taken to imply a relatively small degree of risk. In addition, previous and current PE ratios of the firm under consideration and of other firms of similar size and occupations were examined. Eventually a judgment was made by the analyst about the likely future PE ratio for the firm being evaluated. Unfortunately we were not able to identify a detailed common thread between the different analysts to explain how each arrived at his judgment of an appropriate PE ratio. The major similarity was that none of the analysts seemed to use a formal model to estimate the PE ratio.

As we noted above, the procedures for estimating earnings varied considerably between analysts. The two London stockbroking firms represented the extremes of a quite wide spectrum and we shall describe each of their procedures briefly in order to illustrate the diversity of approaches.

The firm at the 'analytical' end of the spectrum maintained its own computerised models of the UK and world economies. In order to estimate a company's future earnings, the company's income statements for the last ten years were first analysed in more detail than was readily available in the published statements. Turnover, trading profit and pre-tax profit were included in the analysis and the analyst attempted to decompose the company's consolidated results into as small a set of individual activities as possible, using the accounts of subsidiary companies when available. The analyst then produced a forecast of turnover and operating profit for the next twelve to eighteen months, using the analysis of the company's previous results and international, national and industrial economic forecasts from the firm's computerised models. Long term trends in each line of business were examined with particular emphasis being given to the susceptibility of the company's activities to the effects of inflation, interest rate changes, currency fluctuations, foreign government interference and changes in the policy of the British Government towards the industry in which the company operates. Movements in any lead indicators were also considered; for example, carpet and curtain sales are generally linked to the quantity of house sales. All this information, together with a judgment of how well the company has

traditionally fared relative to other businesses in its industrial sector, was used by the analyst to estimate the future turnover of the company. The analyst next assessed the stability of the operating performance ratios and applied these to estimate the company's future earnings. At this stage, the analyst often contacted the company to discuss his predictions although this contact sometimes occurred earlier in the process. Meetings with company officials enabled analysts to obtain some indication of the management's philosophy as well as an intimation of the general prospects for the company, its competitors and the industry as a whole.

The London stockbroking firm at the 'artistic' end of the spectrum of procedures for estimating earnings presented a very different picture. No systematic forecasting procedure was employed. No macro-economic model was maintained because the partners did not regard economists as being a 'worthwhile investment.' Although the firm undertook 'detailed analyses' of between 500 and 600 companies, these were little more than summaries of the Annual Report. The Annual Report formed an important part of the evaluation process, even though the analysis tended to take the form of how well the financial statements 'looked.' The two partners interviewed indicated that their firm had established the trust of managements in a number of companies and so they could gauge the standing and future prospects of a company from these sources without having to go through the time-consuming process of detailed analysis. Indeed, the earnings forecasts used were often the result of the discussions between the brokers and company management and they tended to follow the company's own predictions.

Although the two London stockbroking firms were at opposite ends of a spectrum it should be pointed out that the remaining four firms interviewed were not distributed evenly between them on the spectrum. All four were bunched towards the 'analytical' rather than the 'artistic' end of the spectrum, although the procedures they adopted to estimate earnings were generally less thorough and less rigorous than those used by the first London stockbroking firm discussed above.

The results of the unstructured interviews were of considerable help in designing the questionnaire. There were sufficient broad similarities between the procedures followed by the different analysts interviewed to suggest areas where a much larger sample of respondents would be able to relate to the areas about which questions were being asked. In other words, we felt confident that we could design questions which would be regarded as relevant, important and unambiguous by practising investment analysts. In addition, a sufficiently large number of differences emerged in the interviews to indicate areas where further research, with a statis-

tically significant number of analysts, might throw a helpful light on the range and frequency of current practices.

3 The questionnaire

A first draft of the questionnaire was prepared based on the interviews described in the previous section and on an examination of current text books on investment analysis as well as relevant research studies. Following discussions with colleagues, we prepared a second draft of the questionnaire which was then completed by the investment analysts who had participated in the interviews. The analysts were also asked for their comments and, as a result of these, a third and final draft was prepared which contained a total of 100 individual questions.

The analysts to be sampled were selected from the UK section of the Member Societies Yearbook of the European Federation of Financial Analysts' Societies; UK members belong to the Society of Investment Analysts. The sample excluded those members whose address was outside the United Kingdom and this exclusion meant that there was a total of 1,654 eligible analysts in the population to be sampled. Every fourth name was chosen plus a random sample of the remainder to obtain a sample size of 465 individuals, i.e. 28.1% of the eligible population. In order to test the essentially random nature of the selection procedure, ten pages of the Yearbook were examined to check the ratio of institutional to stockbroking analysts. No significant difference was found.

The population size was increased by extracting a list of 40 non-members from a survey of investment managers published by Continental Illinois Ltd. (1980), showing who were the 'top' UK analysts. These non-members were all employed by the large UK stockbroking firms and tended to specialise in a particular market sector. Although this non-members list covered only one sector of the population of non-members, it at least provided an opportunity to test whether any differences existed between these specialist stockbroking non-members and their counterparts who are members of the Society of Investment Analysts.

Five hundred and five questionnaires were posted during the five days of 16-20th March 1981. The questionnaires contained no clue as to the identity of the respondent except that a mark was added to those questionnaires sent to non-members. Fortunately, although the respondents had the opportunity to return the questionnaires anonymously, all but 47 of the 257 who responded to the first request included their name and address and so only 295 second request letters were required, being sent on 6-7th April 1981. A further 47 completed questionnaires were received in response to this second request.

Table 1
Principal Activity of the Analyst's Organisation

	<i>Number</i>	<i>Percentage</i>
Stockbroker	108	53.5%
Stockjobber	2	1.0%
Insurance company	29	14.3%
Bank	20	9.9%
Pension fund	17	8.4%
Investment management	14	6.9%
Investment trust	5	2.5%
Industrial company	3	1.5%
Others	4	2.0%
	<u>202</u>	<u>100.0%</u>

A total of 304 replies was received, equal to a response rate of 60.2%. Of the 304 who replied only 202 individuals analysed the ordinary shares of companies quoted on the UK Stock Exchange. The remaining analysts analysed other UK securities such as gilts, property, etc., and analysed overseas investment opportunities. These 102 analysts have been ignored in the remainder of the paper, which will be concerned only with the 202 'UK equity analysts.'

The types of organisations for which the analysts work are given in Table 1. From this table it can be seen that over half of the analysts work for stockbroking firms and the remainder work in organisations whose main objective is the management of portfolios. The two stockjobbers are difficult to categorise, but since they do not produce information for external clients in the same way as stockbrokers, they are probably more akin to institutional analysts than stockbroking ones.

Two tests were conducted of the validity of the questionnaire responses. The first was designed to ascertain whether the layout of the questionnaire influenced respondents. Two versions of the questionnaire were used, differing only in their layout. Specifically, for the second version the order in which questions appeared was changed and the direction of the possible answers was reversed. A Chi-square test was performed on the answers to each question by questionnaire type.

Twenty of the 101 questions were found to produce answers which were significantly different at the 5% level between the two types of questionnaires. Eight of these differences occurred in a block of eighteen questions inquiring about the 'use' of eighteen different information sources. When these 'use' questions preceded an equivalent block of eighteen questions inquiring about the influence of the same sources, the replies indicated a greater use than did the answers when the same 'use' questions were asked after the 'influence' ones. However, whilst the order of the 'use' and 'influence' blocks of questions affected the 'use' responses, no significant differences were found for

the 'influence' responses. This finding can be interpreted as implying that the 'use' responses were modified by the earlier answers to the 'influence' questions and in particular that respondents' perceptions of the amount of use of an information source can be reduced if the respondents are compelled to consider first how much influence is exerted by that information source. The remaining twelve significantly different answers are slightly more than one would expect by chance and there are no obvious explanations for their occurrence. However, these differences were borne in mind when making judgements on the results. The findings serve to illustrate the degree of caution which is necessary when interpreting the results of questionnaire surveys; few of the questionnaire surveys with which we are familiar in the accounting literature consider the likely biases resulting from questionnaire layout.

The second validity test was to check for non-response bias. A comparison was made between the replies received after the second request letter was posted and those received before the second request was made. A Chi-square test revealed no significant differences at the 5% level. If the questionnaires returned after the second request letter are more likely to be typical of non-respondents than are those returned without a reminder, then the lack of any significant difference between the two sets of questionnaires provided some evidence that the 60.2% response was representative of the entire sample.

4 Results of the questionnaire survey

In this section we describe the results of the questionnaire survey. We consider particularly the appraisal methods used by analysts, the sorts of forecasts they make, the sources of information they think important and the extent to which discussions with company management feature in the analysts' decision making processes. The results tend to reinforce the picture which emerged from the unstructured interviews and, in addition, provide more detailed information about that picture.

In the survey, we collected sufficient information to enable us to partition our sample in various ways, where we expected that the partitioning would reveal significant differences between one category of respondent and another. We distinguished between institutional analysts (i.e. all those respondents listed in Table 1 except stockbrokers) who specialise in one market sector (specialists) and those who deal with more than one sector (non-specialists). We also distinguished between non-specialist institutional and non-specialist stockbroking analysts, between specialist and non-specialist stockbroking analysts, and between specialist stockbroking members of the

Table 2
Features of the Analyst's Working Environment

	<i>Mean Response</i>	<i>Standard Error</i>
Number of analysts employed	10.7	0.66
Number of years spent as an investment analyst	12.8 years	0.51
Percentage of working week spent analysing UK equities	60.3%	2.16
Number of companies analysed regularly	40.9	2.66
Number of companies analysed each year on an irregular basis	26.3	1.94

Society of Investment Analysts and specialist stockbrokers who are not members of the Society. Although there were some significant differences (at the 5% level, using a Chi-square test) in each of these cases, they were generally not more than would be expected by chance. Of much greater significance were the results of partitioning the sample between respondents who themselves use their own analyses for purposes such as portfolio management and respondents who make recommendations to third parties. The heterogeneity of the investment analyst group is discussed in Moizer and Arnold (1984). In this paper we consider only the results for the group as a whole.

The features of the 'average' equity analyst's working environment are summarised in Table 2. He works in an organisation which employs just over ten analysts and he has spent just under thirteen years working as an analyst. He devotes about 60% of his working week to the analysis of UK equities and analyses about 40 companies on a regular basis and a further 26 each year on an irregular basis.

Appraisal Methods

From Table 3, the primary analysis technique is clearly fundamental analysis with technical analysis a poor second and beta analysis hardly used at

all.¹ The extent to which each technique is used is consistent with its perceived usefulness as shown in Table 4; 90% of respondents viewed fundamental analysis as either 'extremely useful' or 'very useful' whereas the equivalent percentage for technical analysis was 16% and for beta analysis only 5%.

When appraising a share by the use of fundamental analysis, analysts consider an average of about five years' previous financial results. Tables 5 and 6 provide more detail on the analysts' approach to fundamental analysis. The unstructured interviews suggested that the estimate of the PE ratio was an important feature of the analysts' approach. This impression is reinforced by the data in Table 5. Over 80% of analysts 'almost always' or 'usually' attempt to estimate what a company's present PE ratio 'should' be, based upon their evaluation of the past and future earnings of the company. Most then use the estimated PE ratio to estimate the company's market value. Also of importance are various financial

¹The following descriptions were given in the questionnaire: fundamental analysis—'the analysis of such fundamental factors as general business conditions, industry outlook, earnings, dividends, quality of management, etc.'; technical analysis—'an analysis of market based factors such as share price movements, charts, etc.'; beta analysis—'analysing the responsiveness of the price of a particular company's share to changes in the value of some market average.'

Table 3
Frequency of Use of Methods of Investment Appraisal

	<i>Almost always 96-100%</i>	<i>Usually 66-95%</i>	<i>Sometimes 36-65%</i>	<i>Seldom 6-35%</i>	<i>Hardly ever 0-5%</i>	<i>Average*</i>
Technical analysis	22	26	60	50	44	41.3%
Fundamental analysis	153	40	5	3	0	92.0%
Beta analysis	4	9	37	49	102	20.9%

*Responses are summarised as means, based on the midpoints of each frequency interval.

Table 4
Perceived Usefulness of Methods of Investment Appraisal
 (5 point scale: 1 = extremely useful to 5 = of no use)

	<i>Mean Response</i>	<i>Standard Error</i>
Technical analysis	3.1	0.06
Fundamental analysis	1.5	0.05
Beta analysis	3.5	0.05

Table 5
Factors Considered in Fundamental Analysis

	<i>Almost always 96-100%</i>	<i>Usually 66-95%</i>	<i>Sometimes 36-65%</i>	<i>Seldom 6-35%</i>	<i>Hardly ever 0-5%</i>	<i>Average*</i>
Various financial ratios	70	60	44	12	13	71.0%
Estimate of 'true' value of PER	92	66	25	7	6	80.1%
Estimate of market value by applying PER to a forecast of next year's earnings	83	57	25	19	13	72.8%
Estimate of future dividend yield	87	59	34	12	5	77.1%
Estimate of NPV of future cash flows	16	15	42	49	73	30.9%
Company's net asset value	61	59	55	21	3	69.7%

*Responses are summarised as means, based on the midpoints of each frequency interval.

ratios, estimated future dividend yield and the company's net asset value. Surprisingly, in view of its academic respectability, the discounted cash flow technique (net present value) is used only infrequently, although several analysts did note that it was used for the evaluation of shares in oil companies and shipping companies. The general approach to fundamental analysis is possibly best summed up in the words of one analyst:

DCF although mathematically very appealing is far too precise an estimate of a company's

worth, given the inexact nature of investment. More important is the overall view of a share including all factors: earnings, quality of management and products, future outlook and net asset value; information which is gradually gained with experience and somehow distilled, haphazardly if you like, into some kind of P/E ratio, the value [of which] is dependent on one's view about the likely growth of earnings per share. [This value is then] compared with the P/E ratio the market gives [and] the difference between the two, i.e., your idea of what the P/E

Table 6
Fundamental Analysis: Frequency of Use of Alternative Asset Valuation Bases

	<i>Usually</i>	<i>Sometimes</i>	<i>Seldom</i>
Historical cost balance sheet value	137	42	12
Value adjusted for current cost of fixed assets and stock	75	60	53
Value adjusted for general purchasing power changes	23	48	105
Value on realisation	54	76	62

Table 7
Features of Analysts' Forecasts

	<i>Mean Response</i>	<i>Standard Error</i>
How many months ahead are forecast	22.1 months	1.10
How often each of the following factors is forecast:*		
Turnover (sales)	62.2%	2.60
Pre-interest profit	69.2%	2.61
Pre-tax profit	86.0%	1.78
Post-tax profit	74.2%	2.42
Cash flows	62.4%	2.28
Dividends	81.4%	1.99
Earnings per share	87.8%	1.72
Ratio of turnover to capital employed	32.4%	2.23
Return on capital employed	51.6%	2.52
Price/earnings ratio	78.3%	2.20
Market value of the share	61.9%	2.78

*Responses were given under five categories from 'almost always 96-100%' to 'hardly ever 0-5%', identical to those shown in Tables 3, 5 and 9. The mean responses shown above are based on the midpoints of each frequency interval.

ratio should be and what the market thinks it should be, is the extent of cheapness or dearness on a long-term view.

Also surprising, in view of the publicity given to 'inflation' accounting in recent years, is the popularity of historical cost balance sheet figures relative to current cost, realisable value and general price level adjusted figures (Table 6). It will be interesting to see whether this position changes as current cost and other figures become increasingly available and, possibly, better understood.

Forecasts of Analysts

When appraising a company's ordinary shares, over 97% of analysts forecast some aspects of the performance of the company or of its shares. Details of the features of analysts' forecasts are given in Table 7. The average forecast period seems to be between eighteen months and two years. This relatively short period was justified by one respondent as follows:

An estimate of what a share will be making or doing in five years is often pure guesswork, although it is important to have a rough idea. To try and map out forecasts for all the ratios mentioned above, five years hence would be a waste of time; you have a rough idea in your head as to how well a share will be doing in five years' time and that is all.

Over 80% of the analysts who prepare forecasts 'almost always' or 'usually' forecast earnings per share (91%), pre-tax profit (88%), dividends (83%) and PE ratio (80%). The forecasting of each of these four items except dividends is consistent with

our previous description of the importance of the PE ratio in share evaluation. The forecast of dividends, taken together with the forecast of earnings, provides the analyst with an estimate of the company's likely future dividend cover, which may be an important element in the prediction of the risk and growth factors to be included in the determination of an appropriate PE ratio.

Of the remaining factors listed in Table 7, all but return on capital employed and ratio of turnover to capital employed are 'almost always' or 'usually' forecast by a majority of the analysts who prepare forecasts. Nevertheless, the popularity of forecasts of conventional accounting earnings numbers relative to cash flow forecasts does suggest that analysts' appraisal procedures and valuation models are more dependent on accruals-based earnings than on cash flows.

Sources of Information

Table 8 lists eighteen possible sources of information and indicates how influential each one is perceived to be. As might be expected, the most influential sources are perceived to be the company's annual profit and loss account and balance sheet and its interim results. Perhaps more surprisingly, the next most important source is perceived to be discussions with the personnel of the company being appraised. This is regarded as a more important source than, for example, any of the information in the company's Annual Report with the exception of the profit and loss account and balance sheet. Other items having an average score equivalent to at least 'some influence' on the scale used in the questionnaire (i.e. an average score of 3 or lower) are the statement of source and application of funds, the chairman's statement, a

Table 8**Influence of Various Information Sources**

(5 point scale: 1 = vital influence to 5 = no influence)

	<i>Mean Response</i>	<i>Standard Error</i>	<i>Rank</i>	<i>Lee and Tweedie Rank*</i>
Company's annual report:				
Chairman's statement	2.32	0.06	6	4
Directors' report	2.63	0.07	8	9
Balance sheet	1.68	0.05	2	1 =
Profit and loss account	1.66	0.05	1	1 =
Source and application of funds	2.20	0.07	5	7
Current cost data	2.88	0.08	10	10
Value added statement	3.40	0.08	15	—
Unqualified audit report	3.95	0.09	17	—
Qualified audit report	2.49	0.09	7	—
Quarterly and half-yearly results	1.91	0.06	3	3
Employee newsletters	3.90	0.06	16	11
Government industry statistics	3.23	0.07	13	—
Statistical and information services	2.90	0.08	11	8
Financial press	2.81	0.06	9	6
Trade journals	3.26	0.07	14	—
Companies house	3.98	0.07	18	—
Company personnel	2.09	0.08	4	5
Other investment analysts	3.21	0.08	12	—

*Source: Lee and Tweedie (1981), Tables 39, 45 and 51. No entry indicates information not included in Lee and Tweedie study.

qualified audit report, the directors' report, the financial press, current cost data, and statistical and information services. The least important sources are data from Companies House, an unqualified audit report, employee newsletters, the value added statement, trade journals, government industry statistics and other investment analysts.

We became aware of the perceived influence of discussions with company personnel during the interview stage of the survey. Their high importance is particularly impressive because, as a source of information, they are less readily available and, in consequence, more costly than the annual accounts. Furthermore, the actual influence of the discussions may be higher than reported. Respondents might have understated their importance for fear that disclosure of the true importance could result in suspicions of 'inside information' being used with a consequent increase in the probability of such use being effectively controlled. The contents of the annual accounts and of the interim results announcements are well known. The content of discussions with company personnel, on the other hand, is not and so we included in the questionnaire a separate section concerning this item.

Discussions with Company Management

Most analysts discuss a company's financial performance with its management at least once or

twice a year and over 20% have such discussions more than three times a year. Table 9 shows how frequently seven items of information are provided by company management during discussions. The most frequently provided items are reasons for the company's past trading performance, details of management's long-term objectives and plans and the reasons for balance sheet changes. Other pieces of information provided by management (not included in Table 9) that were cited by respondents more than twice, are data on costs and margins (six times), the outlook of demand for the company's products (five times), the current labour situation (four times), the effects of the general economic climate (four times), plans for future capital investment (three times) and information on competitors (three times).

Many analysts wrote comments on this section, which was clearly the most contentious part of the questionnaire. In spite of the perceived influence of information provided by management, some of the analysts appear to be fairly sceptical about management opinions as can be seen from the following comments:

Management tend to have an inflated view of their equity and do not understand the discounting mechanisms of the market. They are often good negative indicators of events!

Some managements, particularly at or near the

Table 9
Frequency of Provision of Information by Company Management

	<i>Almost always 96-100%</i>	<i>Usually 66-95%</i>	<i>Sometimes 36-65%</i>	<i>Seldom 6-35%</i>	<i>Hardly ever 0-5%</i>	<i>Average*</i>
Details of changes in product range	34	63	59	8	8	67.2%
Details of research and development projects	14	51	75	21	10	56.8%
Long term objectives and plans	56	82	32	4	2	78.4%
Changes in key personnel	27	64	51	24	8	62.6%
Reasons for past trading performance	101	61	11	0	2	87.8%
Reasons for balance sheet changes	61	75	29	7	3	77.9%
Management comments on analyst's own forecasts	12	39	71	22	27	49.2%

*Responses are summarised as means, based on the midpoints of each frequency interval.

year end, are anxious to 'steer' an analyst towards a consensus (usually 5-10% *below* the expected out turn); others are quite indifferent to any possible random shocks in their share prices...

Criticisms of Annual Accounts

During the interview stage of our survey, several analysts suggested respects in which company annual accounts might be improved. One section of the questionnaire noted ten such areas and respondents were asked to express their views on each area. In only two cases was there strong agreement (over 70% of respondents agreed as opposed to disagreeing or feeling neutral) about the validity of particular criticisms. It was strongly agreed that 'off balance sheet finance', such as leasing, is not disclosed adequately and that there is insufficient information about the sales, operating profit and assets employed by each of a company's different business activities. Since the questionnaires were completed, the UK Accounting Standards Committee has issued an exposure draft on accounting for leases and hire purchase contracts (Accounting Standards Committee, 1981).

With the exception of the two areas mentioned above, analysts did not feel strongly that changes to the current content of annual accounts were needed. However, this section of the questionnaire elicited some illuminating comments. Many analysts noted that there is a considerable variation between different companies' disclosure levels, the best giving all the information required, and the worst giving very little. One view that emerged is expressed in the following quotation:

Rather than criticise Annual Reports in general, I would rather see the worst, i.e., those giving the least information (for instance, ...) brought up to the level of the best (., ...).

Nevertheless, there was also a strong feeling expressed by some analysts that improving the quality of annual accounts would be detrimental to the analyst's own self-interest, as exemplified by the following comments:

As an investment analyst with well established contacts in his sector, any significant widening of available information would not necessarily be welcome at present; I have privileged sources. If we were given all these, what is the point of analysis?

The trouble with this question is that if all the above information was disclosed by companies, inefficient inexperienced analysts would be put on the same basis as analysts who are prepared to take the trouble to ask this sort of question.

Most of these criticisms reflect an unwillingness of analysts to sit down and work out the answers.

These comments are hardly surprising (although it may be surprising that analysts are willing to make them!). If they do, in fact, represent a general view amongst analysts then it is evident that the interests of analysts may be best served by a system of annual accounting which is different from that which would be most useful to at least some individual investors, who might prefer more straightforward and comprehensible accounting information. In consequence, it may be misleading

to interpret the information requirements of professional analysts and investment advisers as though they were representative of those of the entire shareholder group.

5 Comparison with Lee and Tweedie

We noted earlier that the only really comparable study to ours of UK investment analysts is contained in Lee and Tweedie (1981). The methodology used by Lee and Tweedie differed from ours. They used undergraduate students to conduct structured interviews using a prepared questionnaire. The population from which they sampled was also different; they sampled from organisations rather than individual analysts, resulting in their sample containing a relatively smaller number of 'large firm' analysts. Finally, they achieved an overall response rate of only 29% and, in consequence, the effects of non-response bias could be significant.

It is interesting to compare the perceived influence of various information sources as revealed by the two studies. The rankings from our study and from Lee and Tweedie's are shown in Table 8. In spite of the differences between the methodologies, populations and response rates of the two studies, the rankings are remarkably similar. In both cases, the most influential information sources are perceived to be the annual profit and loss account and balance sheet and the interim results. Also of high perceived importance are discussions with company personnel, the chairman's statement and the statement of source and application of funds. The similarities between the rankings reinforce confidence in the results of this part of both studies.

6 Commentary on results

In this section we comment on the results of the questionnaire and interview surveys described above. The primary analysis technique used by analysts is fundamental analysis. A possible explanation for the dominance of fundamental analysis is that this approach most closely fulfils one of the job specifications of the analyst—to identify those shares which appear to be mis-priced by the market. In addition, fundamental analysis, more than technical analysis or beta analysis, gives analysts who report to third parties the chance of showing how much data they have collected. Lengthy reports are produced containing a wealth of detail, which may increase the recipient's confidence in the recommendation and provide a feeling of 'value for money'. To a lesser extent, technical analysis may also provide this sort of opportunity to the analyst, as it permits the production of numerous charts which could impress the financially naive investor. In contrast, beta analysis

requires little more than stock market trading data. Another reason for the difference in the usage and influence of the three techniques could be that each one is seen as serving a different purpose. Technical analysis may be viewed in practice as a method for determining when a share should be purchased, i.e., having ascertained by fundamental analysis whether the share is worth acquiring, the analyst would then use technical analysis to determine the timing of the purchase. Beta analysis, on the other hand, may be viewed as being useful primarily for the evaluation of portfolio management performance.

The application of fundamental analysis adopted by most analysts involves an attempt to identify shares which seem to be over- or under-valued. In order to calculate a value with which to compare the current market value, a company's earnings for a subsequent year calculated on a historical cost basis are first estimated. A PE ratio, apparently based heavily on the analyst's experience and judgement, is then applied to estimated earnings to obtain an estimate of future market value.

This application of fundamental analysis contrasts with the sort of general approach usually recommended in academic articles and books on investment analysis. The recommended approach to share valuation involves discounting expected dividend payments. Future dividends are first estimated, often based on current dividends and on the forecast rate of growth expected in dividends. Alternatively and equivalently future earnings and payout ratios may be estimated. There is as yet no consensus in the literature concerning the basis which should then be used to calculate a discount rate. However, it is generally agreed that the rate chosen should reflect the fact that £1 today is worth more than the certain expectation of £1 in the future and that investors are usually risk-averse. Furthermore, the risk borne by an investor in a security depends on the covariance of the returns expected from the security with those expected from a market portfolio. The risk factor in the discount rate depends on the security's beta value, i.e., on that part of the variability of its return which cannot be diversified away.

It is possible that the approach apparently adopted by analysts is, in fact, equivalent to that recommended in the accounting and finance literature. This will be the case if the PE ratio applied to expected earnings reflects appropriately the time value of money, the company's expected payout ratio, the expected growth rate and the systematic risk associated with the company's expected returns. It may also have to include some adjustment to reflect the differences between historical cost and current cost based earnings. If, as seems likely, all these conditions are not satisfied, the two approaches will not give equivalent answers. This has

interesting implications for, amongst other things, the interpretation of the results of studies which attempt to assess market efficiency.

Many such studies attempt to identify the speed with which new information is reflected in market prices and whether the change in market price seems to be in the right direction.² The results of our survey may mean one, or both, of two things. First, it is possible that even though the market reacts quickly and in the right direction to new information and is hence efficient in that sense, the resulting prices are not in accordance with the general form of share valuation model widely recommended in the accounting literature. Second, even if market prices are set according to the share valuation models recommended in the literature, many analysts are not using those models and in consequence the institutional investors by whom they are employed or the clients to whom they make recommendations may be missing opportunities to make gains or to avoid losses when new information becomes available. Either of these implications may be important in an assessment of the social welfare consequences of existing and potential accounting and other information systems available to investment analysts and to shareholders.

In order to evaluate the recommendations made by analysts, and the share purchase and sale decisions which they influence, we need strictly to be able to measure their impact on social welfare. As Beaver (1981, chapter 6) and others have noted, such an evaluation is not at present possible unambiguously in a world of heterogeneous beliefs, preferences and endowments of resources. Nevertheless decisions concerning the provision of information, which have social welfare implications, are made by bodies such as the Accounting Standards Committee (in the UK) and the Financial Accounting Standards Board and the Securities and Exchange Commission (in the USA). If such bodies are to act, as far as they are able, in the 'public interest' it is important that they recognise that market efficiency, as that term is usually used in the accounting literature,³ does not imply that the choice of information system is unimportant to the maximisation of social welfare.

We comment finally on the observation that many analysts perceive there to be a large disparity in the present disclosure policies of UK companies. Some analysts would like the worst 'offenders' to improve, while others admit to being quite happy

with the present (inadequate) disclosure levels, fearing that any improvement might be detrimental to their own self-interest by allowing their clients (for example, individual investors with relatively little financial expertise) to undertake their own analyses of the desirability of alternative share investment opportunities. As we noted earlier, this potential conflict of interest between analysts and their clients means that analysts' information requirements may not be good proxies for those of the entire investor group. Furthermore, it suggests that in order to understand better the decision processes of participants in securities markets it may be necessary to attempt to model in some detail the relationships between analysts and their investor clients. This conclusion is reinforced by our finding that, although it is much less popular than fundamental analysis, technical analysis is used at least 'sometimes' by a majority of financial analysts (Table 3). On the face of it, any use of technical analysis is irrational if the capital market is efficient; its use presumably involves some cost but provides no benefits as the information it reveals is already fully incorporated into share prices.

7 Summary and recommendations

In Section 1 we stated that our main objectives were to learn something about the general procedures adopted by UK investment analysts in their appraisal of ordinary shares of companies and to suggest areas in which further research might be worthwhile. Throughout the paper we have stressed the difficulties and limitations of this type of research. Nevertheless, the interview and questionnaire surveys have provided answers to some of the questions we have raised in which we might have at least some confidence. The results also provide an interesting alternative perspective to those obtained from market-based research studies.

Although the questionnaire responses provide information about the general appraisal methods and types and sources of information which are used by analysts, they are of less help in an assessment of how various items are used in arriving at a recommendation about whether a particular share should be purchased or sold. The way in which particular items are used may vary depending, amongst other things, on the purpose of the analysis and on the nature of the business of the company whose shares are being appraised. Where there are numerous differences of detail between the precise procedures used by analysts, as appears to be the case for UK investment analysts, a questionnaire survey is unlikely to be a satisfactory means of capturing these differences; a questionnaire which provided the necessary level of detail would be so long as to discourage probably

²For a summary of the research on the efficient capital markets hypothesis see Dyckman *et al.* (1975) and Beaver (1981), chapters 5 and 6. For a summary of UK research see Richards (1979), especially chapter 3.

³For example, Beaver (1981, page 142) states: 'As defined here, a securities market is said to be efficient with respect to an information system if, and only if, the prices act *as if* everyone observes the signals from that information system'.

all but the most committed respondents. More appropriate research methods for a study of how particular types of information are used would be direct observation, interviews and laboratory experiments, possibly with questionnaires being used to clarify and substantiate certain aspects of the decision making process.

Two particular areas in which further information is required are the procedures which analysts use to forecast future earnings and the methods by which they arrive at their estimate of the appropriate PE ratio for a company. As we have noted, a better understanding of this latter point may prove to be the key to reconciling the approaches used by analysts with those widely recommended in the accounting literature. It is our view that further progress in the above two areas would be of interest to both accounting researchers and accounting policy makers.

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The British Accounting Association, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £100 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin. The winning article in 1982/83 was "The Political Implications of Accounting and Accounting Standard Setting" by David Solomons (Spring 1983).

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Accounting for Business Combinations in an Age of Changing Prices

J. Edward Ketz*

One of the seemingly perennial problems of standard setters is to establish accounting rules for business combinations. It has been the subject of several pronouncements: for example, in the United States, ARB 40, ARB 43, ARB 48, APB 16 and APB 17. The Financial Accounting Standards Board (FASB) added the topic to its agenda in 1974 and issued a discussion memorandum in 1976. Action on the subject was delayed until the projects on objectives of financial reporting and on elements of financial statements were completed. The topic of accounting for business combinations and purchased intangibles was removed from the FASB's agenda during 1981 because of its low priority in relation to other projects (e.g. the conceptual framework). Recently, however, the FASB has replaced the project on its agenda and has formed a task force to investigate the topic.¹

In the United Kingdom, purchase accounting has been the standard practice (as in SSAP 14). However, the Companies Act of 1981 legalised the use of merger accounting. With that impetus, the Accounting Standards Committee issued ED31, *Accounting for Acquisitions and Mergers*. This specifies conditions under which a business combination would be treated as a merger; these conditions are that a combination offer be accepted by at least 90% of the shares of the offeree and that at least 90% of the fair value of the consideration transacted be equity capital.²

Traditional arguments in accounting for business combinations have focused on purchase (acquisition accounting in British terminology) versus pooling (merger accounting). These debates have been misdirected; it is more important to ascertain which measurement basis is to be used for the business combination. If price level adjusted cur-

rent value accounting is adopted, then the usefulness of accounting for business combinations would be enhanced because of greater relevance, greater interpretability and reduction of perceived deficiencies of both purchase and pooling accounting. In fact, if price level adjusted current value accounting is adopted, the major differences between purchase and pooling vanish.

Purchase v pooling

Under the pooling of interests method, the combination is not considered as a sale of a business but rather a combining of two entities. This new enterprise is then treated as if it had existed for all previous periods of the combining firms. Since no exchange has taken place and the ownership interests of the combining entities continue as ownership interests in the surviving company, the combination is accounted for on the existing book values that the formerly separate entities had maintained. The pooling of interests method has been criticised.³ While these opponents cite many censures of pooling, one may categorise them as the following three points.⁴ First, a business combination involves a transfer of assets between independent entities, even if it is effected by a stock swap. Thus, a combination is a transaction. To ignore the economic fact that combinations are transactions, as pooling does, is wrong. Second, pooling involves asset understatement which can become an instant source of earnings to the firm. For example, if a firm issues one million shares worth \$100 each to pool with a firm that has a book value of \$1 per share, then future earnings will be increased by \$99 million.⁵ Such artificial creation of earnings is unrealistic and undesirable.

*The author thanks Deric Bardo, Bob Sterling, Art Wyatt and a referee for their many helpful comments.

¹FASB, *Status Report* (April 8, 1982) p. 5 and FASB, *Status Report* (April 27, 1982), p. 3-4.

²For more details, see J. Whittaker and T. E. Cooke, 'Accounting for Goodwill and Business Combinations: Has the ASC Got It Right?' *Accountant's Magazine* (January, 1983), pp. 18-21. A description of the accounting for business combinations by several other countries is given in C. W. Nobes and R. H. Parker, *Comparative International Accounting* (Philip Allan, 1981), pp. 241-250.

³For example, see Arthur R. Wyatt, *A Critical Study of Accounting for Business Combinations*, Accounting Research Study No. 5 (AICPA, 1963); Martin M. Eigen, 'Is Pooling Really Necessary?', *Accounting Review* (July 1965), pp. 536-540; George R. Catlett and Norman O. Olson, *Accounting for Goodwill*, Accounting Research Study No. 10 (AICPA, 1968); William C. Foster, 'The Illogic of Pooling', *Financial Executive* (December, 1974), pp. 16-21; and Abraham J. Briloff, *Unaccountable Accounting* (Harper and Row, 1972).

⁴These criticisms, and those of pooling, are generic in nature. They do not apply to all countries.

⁵The example is taken from Foster, *op. cit.*

Finally, the twelve rules of APB 16 which define a pooling are easily bent. Firms may follow the letter but not the spirit of APB 16 or ED 31.

The purchase method for a combination treats it as a sale of one entity's net assets to another. Since an exchange is assumed to have occurred, the assets received are recorded at the fair value of the consideration given. Any excess of the total consideration given over the fair value of the net assets received creates an intangible asset called goodwill. Under US GAAP, purchased goodwill is amortised to income for a period not greater than forty years. The purchase method also has critics.⁶ Their arguments may be summarised as follows. First, the purchase method mixes historical cost accounting (by the acquiring enterprise) and current value accounting (by the acquired firm). This mixture has no conceptual basis and is therefore illogical. Second, purchase accounting can lead to large percentage increases in sales and earnings which are the result of not including the acquired firms into the analysis of previous years. Pooling avoids this problem by showing past results as if the two companies were merged. Third, goodwill is a rather arbitrary figure that really has no economic interpretation. Moreover, it is subject to a rather arbitrary amortisation schedule. Finally, APB 16 and APB 17 have not been completely successful in setting standards in the USA. Corporations have from time to time followed the letter but not the spirit of the accounting pronouncements.

Many of these impeachments of the pooling method and the purchase method lead to guilty verdicts. Both accounting techniques are deficient because both are fundamentally based on the historical cost tradition. The purpose of this paper is to show that the critical issue in the determination of business combination accounting is the underlying measurement of the combined entity's assets, liabilities, owners' equities, and net income. I feel that current value accounting adjusted for general price level movements should be used in accounting for business combinations.⁷ The purpose of this paper is not so much to argue which is better—purchase or pooling—but to argue that standard setters should choose the mea-

surement scheme before considering the accounting method for business combinations. Doing so will virtually eliminate the censures mentioned previously and will provide interpretable accounting numbers.

The measurement bases will be evaluated according to the criterion of interpretability. A datum is interpretable if it can be explained empirically. In this context, Sterling's argument that the relevant attribute is the command over goods is adopted.⁸ Different measurement schemes are explored in the remainder of the paper. It is found that only price level adjusted current value numbers can be interpreted in terms of command over goods.

Interpretability of business combination accounting

To be useful in decision making contexts, a datum needs to be interpretable; that is, it needs to have some empirical meaning. In this section, four measurement bases—historical cost, price level adjusted historical cost, current value, and price level adjusted current value (PLACV)—are evaluated in terms of their interpretability. While some of these systems can be interpreted as number of dollars, only the PLACV measurement can be interpreted as command over goods. Since the latter attribute is more relevant than the first, PLACV accounting should be used for financial reporting of business combinations.

Assume the following situation. At January 1 company X begins operations with \$4000 cash. On that same day it purchases 150 shares of A company stock at \$10 per share. At February 1 the price of A's stock is \$15 per share. Also on January 1 company Y begins operations with \$1000 cash. At the same date Y purchases 140 shares of B company stock at \$5 per share. At February 1 the price of B's stock is \$10 per share. During the period the price of bread, assumed to be the only consumer commodity, increases from 50c to 60c resulting in a Consumer Price Index of 1.2. Finally, on February 1 company X acquires 100% control of company Y by distributing common stock with a market value of \$1700 for all of the outstanding stock of company Y. Notice that X pays exactly the sum of the fair value of the individual assets of Y; thus there is no goodwill. Later I will investigate what to do when goodwill is present.

The individual financial statements are shown in Tables 1 and 2. In Table 1, note that revenues are zero since no sale of securities was made during the period. This also means that the cost of securities

⁶Briloff, *op. cit.*; Michael G. Tearney, 'Compliance with AICPA Pronouncements in Accounting for Goodwill', *CPA Journal* (February, 1973), pp. 121-125; Philip L. Defliese, 'Business Combinations Revisited', *Financial Executive* (September, 1975), pp. 42-47; and Jim Snively, 'Pooling Should Be Mandatory', *CPA Journal* (December, 1975), pp. 23-26.

⁷This idea has been suggested previously by Wyatt, *op. cit.*, Kenneth S. Most, *Accounting Theory* (Grid, 1977), and by Edgar D. Edwards, Philip W. Bell, and L. Todd Johnson, *Accounting for Economic Events* (Scholars Book Co., 1979). Even so, the concept is embryonic in each of these papers. The contribution of this research is to provide a theoretical basis that supports the contention that current value accounting adjusted for general price level movements is the proper way to account for business combinations.

⁸Robert R. Sterling, 'Relevant Financial Reporting in an Age of Price Changes', *Journal of Accounting* (February, 1975), pp. 42-51. My paper is essentially an extension of Sterling's analysis to the accounting for business combinations.

Table 1
Comparative financial reports of X company

	HC		GPL-HC		CV		GPL-C	
	Jan. 1	Feb. 1	Jan. 1*	Feb. 1	Jan. 1	Feb. 1	Jan. 1*	Feb. 1
Cash	\$2500	\$2500	\$3000	\$2500	\$2500	\$2500	\$3000	\$2500
Securities	1500	1500	1800	1800	1500	2250	1800	2250
Total Assets	<u>\$4000</u>	<u>\$4000</u>	<u>\$4800</u>	<u>\$4300</u>	<u>\$4000</u>	<u>\$4750</u>	<u>\$4800</u>	<u>\$4750</u>
Invested Capital	\$4000	\$4000	\$4800	\$4800	\$4000	\$4000	\$4800	\$4800
Retained Earnings	0	0	0	(500)	0	750	0	(50)
Total Equities	<u>\$4000</u>	<u>\$4000</u>	<u>\$48000</u>	<u>\$4300</u>	<u>\$4000</u>	<u>\$4750</u>	<u>\$4800</u>	<u>\$4750</u>
Revenues	0		0		0		0	
Cost of Securities Sold	0		0		0		0	
	<u>\$0</u>		<u>\$0</u>		<u>\$0</u>		<u>\$0</u>	
Gain from holding Securities					750		450	
Loss from holding Cash			(500)				(500)	
Net Income	<u>\$0</u>		<u>\$(500)</u>		<u>\$750</u>		<u>\$(50)</u>	

*Not the reports on January 1; these are the rolled forward statements for comparative purposes.

sold is zero. The January 1 price level adjusted historical cost numbers are obtained by rolling forward the January 1 figures to the February 1 price level by multiplying each of the January 1 historical cost numbers by 1.2. Securities, being a non-monetary asset, are adjusted by a factor of 1.2 for February 1 as well. The loss from holding cash is computed as $(\$2500) \times (1.2) - \$2500 = \$500$. The current value financial statements are like the historical cost statements except that the February 1 balance of securities is revalued at $150 \times \$15 = \$2250$. This also leads to a gain from holding the securities of \$750 ($\$2250 - \$1500$). The January 1 PLACV numbers are equal to the

January 1 current value numbers multiplied by 1.2; in other words, they are rolled forward to February 1 dollars. The February 1 balance of securities equals \$2250 ($150 \times \$15$). The loss from holding cash is calculated in the same way as for the price level adjusted historical cost method. The gain from holding securities equals \$450 ($\$2250 - \$1500 \times 1.2$). The financial reports of Y company are obtained in similar fashion.

Historical Cost Accounting

The familiar historical cost financial statements for the business combination are given in Table 3. Under the purchase method, the January 1 figures

Table 2
Comparative financial reports of Y company

	HC		GPL-HC		CV		GPL-CV	
	Jan. 1	Feb. 1	Jan. 1*	Feb. 1	Jan. 1	Feb. 1	Jan. 1*	Feb. 1
Cash	\$300	\$300	\$360	\$300	\$300	\$300	\$360	\$300
Securities	700	700	840	840	700	1400	840	1400
Total Assets	<u>\$1000</u>	<u>\$1000</u>	<u>\$1200</u>	<u>\$1140</u>	<u>\$1000</u>	<u>\$1700</u>	<u>\$1200</u>	<u>\$1700</u>
Invested Capital	\$1000	\$1000	\$1200	\$1200	\$1000	\$1000	\$1200	\$1200
Retained Earnings	0	0	0	(60)	0	700	0	500
Total Equities	<u>\$1000</u>	<u>\$1000</u>	<u>\$1200</u>	<u>\$1140</u>	<u>\$1000</u>	<u>\$1700</u>	<u>\$1200</u>	<u>\$1700</u>
Revenues	\$0		\$0		\$0		0	
Cost of Securities Sold	0		0		0		0	
	<u>\$0</u>		<u>\$0</u>		<u>\$0</u>		<u>\$0</u>	
Gain from holding Securities					700		560	
Loss from holding Cash			(60)				(60)	
Net Income	<u>\$0</u>		<u>\$(60)</u>		<u>\$700</u>		<u>\$500</u>	

*Not the reports on January 1; these are the rolled forward statements for comparative purposes.

Table 3
Financial reports of XY company historical cost

	<i>Purchase</i>		<i>Pooling</i>	
	<i>Jan. 1</i>	<i>Feb. 1</i>	<i>Jan. 1</i>	<i>Feb. 1</i>
Cash	\$2500	\$2800	2800	2800
Securities	1500	2900	2200	2200
Total Assets	<u>\$4000</u>	<u>\$5700</u>	<u>\$5000</u>	<u>\$5000</u>
Invested Capital	\$4000	\$5700	\$5000	\$5000
Retained Earnings	0	0	0	0
Total Equities	<u>\$4000</u>	<u>\$5700</u>	<u>\$5000</u>	<u>\$5000</u>
Revenues	\$0		\$0	
Cost of Securities Sold	0		0	
Net Income	<u>\$0</u>		<u>\$0</u>	

are those of the parent company. The February 1 figures are determined as follows. Cash is equal to \$2500 + \$300 = \$2800. Securities equals X's \$1500 plus the current value of Y's investment, \$1400, for \$2900. Invested capital is the parent's original invested capital, \$4000, plus the \$1700 new issued stock, for \$5700.

The pooling of interests numbers are obtained as follows. The January 1 figures simply combine X's and Y's individual accounts. Thus, Cash is \$2500 + \$300 or \$2800; Securities is \$1500 + \$700 or \$2200; Invested Capital is \$4000 + \$1000 or \$5000. February 1 numbers are the same.

The pooling method might be criticised because of the understatement of asset values. The combined firm XY can now sell the investment in B for \$1400 to realise an earnings of \$700, or XY might not sell the investment and not recognise any income. Note, however, that a similar situation exists under both pooling and purchase since the financial statements still show X's investment in A at \$1500. The problem is not with the purchase or pooling methods, but with historical cost accounting.

More importantly, both the purchase and pooling financials are not susceptible of interpretation in terms of command over goods. For example, if the securities are sold, one would not receive $4833\frac{1}{3}$ ($2900 \div 0.6$) loaves of bread, nor $3666\frac{2}{3}$ ($2200 \div 0.6$) loaves. Since neither the purchase nor the pooling financial statements are interpretable, the usual debate in business combination accounting is misplaced. The measurement basis needs to be changed.

Price Level Adjusted Historical Cost Accounting

Financial reports for the combination can be prepared on a price level adjusted historical cost basis (see Table 4). The January 1 numbers for the purchase method are simply those of the parent

company. One derives the February 1 numbers as follows. Cash equals \$2500 + \$300 = \$2800. Securities equals \$1800 (X's price level adjusted historical cost basis) plus \$1400 (current value of Y's investment) for \$3200. The loss from holding cash is X's loss.

The pooling financial statements are constructed as follows. Like historical cost, pooling under price level adjusted historical cost accounting simply combines the numbers of X and Y. Only, in this case, one uses their price level adjusted historical cost figures. For January 1: Cash is \$3360 (\$3000 + \$360); Securities is \$2640 (\$1800 + \$840); and Invested Capital is \$6000 (\$4800 + \$1200). For February 1: Cash is \$2800 (\$2500 + \$300); Securities, \$2640 (\$1800 + \$840); and Invested Capital is \$6000 (\$4800 + \$1200). The loss from holding cash, \$560, is the sum of each of the company's losses, \$500 for X and \$60 for Y.

The cash numbers are interpretable as follows. If X (under the purchase method) had used its cash at January 1 to purchase bread, then it could have purchased 5000 loaves of bread ($\$3000 \div 0.60$ per loaf). If X and Y were combined at January 1 (pooling), then the entity could have acquired 5600 loaves of bread ($\$3360 \div 0.60$). For both methods on February 1, the corporation could use the cash to obtain $4633\frac{2}{3}$ loaves ($\$2800 \div 0.60$). The loss from holding cash is also interpretable. Under the purchase method it is $\$500 = \$3000 - \$2500$ which is equivalent to a loss of $833\frac{1}{3}$ loaves ($5000 - 4166\frac{2}{3}$). Under the pooling method the loss equals $\$560 = \$3360 - \$2800$ which is equivalent to a loss of $933\frac{1}{3}$ loaves ($5600 - 4666\frac{2}{3}$).

The other numbers, however, are not interpretable either as number of dollars or as command over goods. For example, if the securities of XY are sold at February 1, then the number of dollars received would not be \$3200 or \$2640. If the securities of XY are sold at February 1 and the

Table 4
Financial reports of XY company general price level adjusted historical cost

	<i>Purchase</i>		<i>Pooling</i>	
	<i>Jan. 1</i>	<i>Feb. 1</i>	<i>Jan. 1</i>	<i>Feb. 1</i>
Cash	\$3000	\$2800	\$3360	\$2800
Securities	1800	3200	2640	2640
Total Assets	<u>\$4800</u>	<u>\$6000</u>	<u>\$6000</u>	<u>\$5440</u>
Invested Capital	\$4800	\$6500	\$6000	\$6000
Retained Earnings	0	(500)	0	(560)
Total Equities	<u>\$4800</u>	<u>\$6000</u>	<u>\$6000</u>	<u>\$5440</u>
Revenues	\$0		\$0	
Cost of Securities Sold	0		0	
	\$0		\$0	
Loss from holding Cash	(500)		(560)	
Net Income	<u>\$(500)</u>		<u>\$(560)</u>	

cash proceeds used to purchase bread, then the number of loaves that could be purchased is not $5333\frac{1}{3}$ ($\$3200 \div 0.60$) or 4400 ($\$2640 \div 0.60$). And, since the value of the securities account is not interpretable, neither is total assets nor total equities.

Current Value Accounting

The current value financial statements are shown in Table 5. Consistent with the philosophy of the purchase method, the January 1 statement is simply the parent's. The February 1 values reflect the combination: Cash is \$2800 ($\$2500 + \$300$); Secu-

rities is \$3650 (each measured at current value, $\$2250 + \$1400$); Invested Capital is \$5700 ($\$4000$ plus the \$1700 new issued stock). The gain from holding securities is attributed to X's holdings ($\$2250 - \$1500 = \$750$). For the pooling of interests method, the following numbers obtain. At January 1, Cash is \$2800 ($\$2500 + \$300$); Securities \$2200 ($\$1500 + \$700$); and Invested Capital is \$5000 ($\$4000 + \$1000$). At February 1, Cash is \$2800 ($\$2500 + \$300$); Securities is \$3650 (same as the purchase method since investments are measured at current value under both alternatives); and Invested Capital is \$5000 ($\$4000 + \$1000$).

Table 5
Financial reports of XY company current value

	<i>Purchase</i>		<i>Pooling</i>	
	<i>Jan. 1</i>	<i>Feb. 1</i>	<i>Jan. 1</i>	<i>Feb. 1</i>
Cash	\$2500	\$2800	\$2800	\$2800
Securities	1500	3650	2200	3650
Total Assets	<u>\$4000</u>	<u>\$6450</u>	<u>\$5000</u>	<u>\$6450</u>
Invested Capital	\$4000	\$5700	\$5000	\$5000
Retained Earnings	0	750	0	1450
Total Equities	<u>\$4000</u>	<u>\$6450</u>	<u>\$5000</u>	<u>\$6450</u>
Revenues	\$0		\$0	
Cost of Securities Sold	0		0	
	\$0		\$0	
Gain from holding Securities	750		1450	
Net Income	<u>\$750</u>		<u>\$1450</u>	

All of the figures can be interpreted as numbers of dollars. If the securities are sold at February 1, then \$3650 would be received. If the securities are sold at January 1, then \$1500 would be received by X and \$2200 would be received by X and Y together. Some of these figures can also be interpreted as command over goods. For example, if XY sells the securities at February 1, then it could purchase $6083\frac{2}{3}$ ($\$3650 \div 0.60$) loaves of bread.

The income number is not interpretable as command over goods even though it is interpretable as number of dollars. Under the purchase method there is an increment of \$750 ($\$4750 - \$4000$). Command over goods at January 1 is 8000 loaves ($\$4000 \div 0.50$) while it is 10,750 loaves ($\$6450 \div 0.60$) at February 1. The net income of \$750 does not reflect the fact that the firm's command over goods increased by 2750 ($10,750 - 8000$) loaves during the month. Under the pooling method there is an income of \$1450. Command over goods at January 1 is 10,000 loaves ($\$5000 \div 0.50$); at February 1 it is 10,750 loaves ($\$6450 \div 0.60$). The net income of \$1450 does not reflect the fact that the firm's command over goods increased by 750 loaves of bread.

Price Level Adjusted Current Value Accounting

The financial statements for the price level adjusted current value accounting are given in Table 6. The January 1 figures are those shown in Table 5 multiplied by 1.2. This, of course, is the roll forward technique. The February 1 asset figures are the same as those in Table 5. The losses from holding cash are the same numbers as those for the price level adjusted historical cost technique, Table 4. The gain from holding securities is, for the

purchase method, \$450 ($\$2250 - \$1800$) and, for the pooling method, \$1010 ($\$3650 - \$2640$).

Consider the purchase method first. If all of the assets had been used to purchase bread at January 1, then 8000 loaves ($\$4800 \div 0.60$) could have been purchased. At February 1, $10,833\frac{1}{3}$ loaves ($\$6450 \div 0.60$) could have been purchased. Thus, the income \$(50) reflects a loss in the command over goods of $83\frac{1}{3}$ loaves. A physical interpretation is depicted on the left hand side of Table 7.

Now consider pooling of interests. If all of the assets had been used to purchase bread at January 1, then 10,000 loaves ($\$6000 \div 0.60$) could have been purchased. At February 1, 10,750 loaves ($\$6450 \div 0.60$) could have been purchased. Therefore, the net income number \$450 is also interpretable as an increase in the entity's command over goods of 750 loaves ($\$450 \div 0.60$ or $10,750 - 10,000$). A physical interpretation is shown on the right hand side of Table 7.

The nature of goodwill

The previous argumentation assumed that no goodwill exists, for X company purchased Y company at the sum of the fair value of the individual assets. The analysis can be repeated with goodwill included and the same conclusion is reached: only PLACV financial statements are interpretable. No matter how one accounts for goodwill—as an asset, expense, or reduction of shareholders' equity—goodwill cannot be interpreted as number of dollars or command over goods under historical cost accounting, price level adjusted historical cost accounting, or under current value accounting. Goodwill also has problems of interpretability

Table 6

Financial reports of XY company PLACV

	<i>Purchase</i>		<i>Pooling</i>	
	<i>Jan. 1</i>	<i>Feb. 1</i>	<i>Jan. 1</i>	<i>Feb. 1</i>
Cash	\$3000	\$2800	\$3360	\$2800
Securities	1800	3650	2640	3650
Total Assets	<u>\$4800</u>	<u>\$6450</u>	<u>\$6000</u>	<u>\$6450</u>
Invested Capital	\$4800	\$6500	\$6000	\$6000
Retained Earnings	0	(50)	0	450
Total Equities	<u>\$4800</u>	<u>\$6450</u>	<u>\$6000</u>	<u>\$6450</u>
Revenues	\$0		\$0	
Cost of Securities Sold	0		0	
	<u>\$0</u>		<u>\$0</u>	
Gain from holding				
Securities	450		1010	
Loss from holding Cash	(500)		(560)	
Net Income	<u>\$(50)</u>		<u>\$450</u>	

Table 7
Financial reports of XY company, PLACV, physical units (loaves of bread)

	<i>Purchase</i>		<i>Pooling</i>	
	<i>Jan. 1</i>	<i>Feb. 1</i>	<i>Jan. 1</i>	<i>Feb. 1</i>
Cash	5000 Loaves	4666 $\frac{2}{3}$ Loaves	5600 Loaves	4666 $\frac{2}{3}$ Loaves
	3000	6083 $\frac{1}{3}$	4400	6083 $\frac{1}{3}$
Total Assets	<u>8000</u> Loaves	<u>10750</u> Loaves	<u>10000</u> Loaves	<u>10750</u> Loaves
Invested Capital	8000 Loaves	10833 $\frac{1}{3}$ Loaves	10000 Loaves	10000 Loaves
Retained Earnings	0	(583 $\frac{1}{3}$)	0	750
Total Equities	<u>8000</u> Loaves	<u>10750</u> Loaves	<u>10000</u> Loaves	<u>10750</u> Loaves
Revenues	0 Loaves		0 Loaves	
Cost of Securities Sold	0		0	
	<u>0</u>		<u>0</u>	
Gain from holding Securities	750		1683 $\frac{1}{3}$	
Loss from holding Cash	(833 $\frac{1}{3}$) Loaves		(933 $\frac{1}{3}$)	
	<u>(83$\frac{1}{3}$)</u> Loaves		<u>750</u> Loaves	

under PLACV accounting if goodwill is treated as an asset or a reduction in shareholders' equity; but if goodwill is treated as an expense, then the PLACV statements are fully interpretable.

From the perspective taken in this paper, it seems that goodwill is not an asset. First, the number does not appear to be relevant to any decision model. Indeed, many users are sceptical of accounting goodwill as can be seen when they subtract it from assets or shareholders' equities to get tangible assets or tangible net worth.

Second, the asset goodwill is not interpretable either as number of dollars or as command over goods. Goodwill cannot be sold, so the company simply cannot receive cash and consequently cannot receive loaves of bread from goodwill.⁹ One might want to interpret goodwill as the excess of cash over the net assets received. But this means that goodwill is nothing more than a plug figure. Moreover, goodwill is partially a function of the negotiating skills between the companies which implies that accounting goodwill is equal to economic goodwill plus or minus a portion caused by lucky or unlucky negotiation. Since it is impossible to dichotomise accounting goodwill in practice, the number remains uninterpretable.

Even if one assumes that goodwill is relevant and that it is interpretable when purchased, it is hard to value goodwill after the purchase date. The life of accounting goodwill is essentially impossible to measure. Therefore, any amortisation scheme is

arbitrary and capricious. Any number attached to goodwill after the purchase date is uninterpretable and unreliable.

A more defensible way of accounting for goodwill is to expense it when the combination occurs. Income is fundamentally a change in wealth at two periods in time. Since goodwill decreases a firm's wealth because it represents assets severed from the entity, goodwill is an expense. Notice that this explanation also is interpretable. Because goodwill is the excess cash paid over the net assets received, goodwill is interpreted as the number of loaves of bread given up in order to acquire another enterprise. Of course, goodwill is an investment; it is paid out in the expectation that future earnings will be increased. However, goodwill itself is a sunk cost. Once paid, accounting goodwill is never recovered. This fact is clearly shown by expensing goodwill.

Conclusion

As has been argued, the critical issue in business combination accounting is measurement. The PLACV basis provides numbers which are interpretable under both purchase and pooling. Not only are relevant and interpretable figures provided, but PLACV statements also eliminate some of the troublesome elements in business combination accounting. Specifically, there is no asset understatement and no illogical mixing of historical cost and current value accounting.

Indeed, the asset and liability section of the balance sheet from the day of the combination onward are exactly the same for the purchase and

⁹Also see Raymond F. Chambers, *Accounting, Evaluation and Economic Behavior* (Prentice-Hall, 1966) and Catlett and Olson, *op. cit.*

pooling methods. The total shareholders' equity is the same although the amounts may be different in Invested Capital and Retained Earnings. Also the income statement would be exactly the same for the purchase and pooling methods for all periods after the consummation of the merger. The only difference between purchase and pooling would be the balance sheets before the combination (January 1 in the examples) and in the income statements prior to the combination (the month of January in the examples).

Since the only significant differences between purchase and pooling would involve the financial reports prior to the combination, the choice between the two methods hinges on the importance of those numbers and their utility to external readers. Obviously some other criterion needs to be invoked, for both purchase and pooling are interpretable under a PLACV approach. It is the author's opinion that pooling should be used be-

cause it seems that better trend analysis will result from the pooling method; for example, it seems more appropriate to view the Securities account as changing from \$2640 to \$3650 than \$1800 to \$3650. The purchase method appears to overstate the increase in the value of securities since it includes a size effect from the business combination as well as the changed economic conditions.

More importantly, though, the major conclusions of this paper are twofold. First, the criticisms of both purchase and pooling are virtually eliminated if the measurement scheme is the PLACV method. Second, once the most appropriate measurement scheme is adopted, the choice between the purchase method and the pooling method is narrowed to the differences in the pre-combination periods. Standard setters need to focus their attention first on the measurement issue and secondly on the issue of purchase versus pooling.

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Financial Objectives, Productive Efficiency and the Regulation of a Subsidised State Monopoly

Irvine Lapsley*

This paper explores the scope for improving the means of regulation of a subsidised state monopoly. There is discussion of the potential adoption of externally-imposed, non-financial performance criteria by a major, declining, state industry which would significantly undermine the importance of its financial objective and its reported financial results. The state monopoly in question is British Rail, but much of this discussion is pertinent to other subsidised state railways and, indeed, to other types of nationalised industry. While BR's freight services are not excluded from the following discussion, the major emphasis is on passenger services. This is because the subsidisation of freight services has been short term and a matter of expediency, unlike that of passenger services, which has been a matter of deliberate policy (Serpell Report, 1983). Also, the case for subsidisation (i.e. that social benefits exceed financial deficits) is generally considered to be most relevant to passenger, rather than freight, services (Dodgson, 1981).

Nevertheless, while this case continues to be made for the subsidisation of BR, the actual subsidies which it has received have not been calculated by reference to the net social benefits of railway passenger operations. There are numerous reasons for this. Thus, the computation of BR's net social benefits entails severe difficulties, particularly as regards the identification and measurement of 'social benefits' (see Lapsley, 1981a, for a detailed discussion). Such difficulties have been underlined by the failure of initiatives (particularly under the 1968 Transport Act) to implement a policy linking subsidies to net social benefits. This failure can be attributed to both the piecemeal approach adopted and to the preference of policymakers for information based on private, rather than social, costs and benefits, despite policy pronouncements to the contrary (see Lapsley,

1983). Given such failures and the necessity of subsidising passenger operations (as evidenced by every option in the Serpell Report (1983),¹ for example), pressures have arisen to regulate the subsidy by the use of non-financial indicators of productive efficiency. The need for this development can be seen from the defects of present policy.

The present subsidy for passenger services, the Public Service Obligation (PSO), was introduced under the 1974 Railways Act. This forms part of the overall scheme of regulation, as subsidy payments form part of BR's external financing limit and the financial objective derived from its statutory financial obligation is expressed as breaking even, *after* receipt of subsidies.² In practice, the PSO is effectively based on the anticipated shortfall in revenue in BR's annual budget. The actual payment is negotiated between BR and the Department of Transport before each financial year.³ Within the overall PSO subsidy, a separate interim financial target has been established for Inter-City services. This is based on an expected contribution toward its costs and, thereby, its expected share of the PSO.⁴

However, the PSO has been the subject of, and is open to, considerable criticism. In the first

¹Even in the most extreme of these options (Option A, 'a commercial railway'), it was envisaged that the unprofitable passenger services would be subsidised by profitable freight services (Serpell Report, 1983, p. 68). However, it is well known that the revenues of rail freight services fluctuate with cyclical changes in the economy (see, for example, Pryke and Dodgson, 1975) and, therefore, it is highly likely that rail freight would be unprofitable in a recession and passenger services would require subsidisation.

²For a detailed discussion of the existing, and past, systems of financial regulation of UK nationalised industries, see Heald (1980) and Lapsley (1981b).

³An upper limit has been placed on the size of the PSO subsidy. This was set, in real terms, at the level of PSO grant paid in 1975. For details of the calculation of the PSO subsidy, see BR Annual Report and Accounts, 1977, p. 15.

⁴Thus Inter-City services had an interim financial target of making a contribution of £178 million (at 1981 prices) towards indirect costs in 1982. It did not achieve this target (Serpell Report, 1983, p. 14).

*The views expressed in this paper are those of the author alone. However, he gratefully acknowledges the constructive comments of Professors T. A. Lee (Edinburgh) and W. Duncan Reekie (Witwatersrand) and an anonymous referee.

instance, the level of the PSO was set at that required to maintain BR's 1975 level of passenger services. However, there was no explicit definition of what was meant by that level of passenger services (Fowler, 1974). Also, the PSO lump sum payment has been severely criticised on the grounds that it provides a poorly defined objective for management and an inadequate means by which the provision of subsidised services might be assessed (Monopolies Commission, 1980). Furthermore, while *ex ante* targets (such as the interim one for Inter-City services and the PSO *per se*) are an improvement upon the open-ended subsidisation of the 1950s and 1960s, they share defects of that earlier policy. Thus, both schemes have been criticised because they facilitate a wasteful and inefficient use of resources (Polanyis, 1974; Pryke and Dodgson, 1975; and Serpell Report, 1983). The fundamental criticism is that no mechanism exists whereby subsidy payments can ensure that subsidised passenger services are provided on an efficient (i.e. least cost) basis.

As a result of such criticisms, the Serpell Report (p. 55) recommended the use of non-financial indicators of productive efficiency, in conjunction with financial objectives, to improve regulation and to eliminate inefficiencies in subsidised operations. The desirability and feasibility of such a scheme of regulation is the subject of this paper. As a prelude, it is worth noting that Serpell is not alone in its advocacy of the use of non-financial indicators—it has had the support of certain economists for some time, as discussed below.

The issues involved are considered in three parts. First, an examination is made of the nature, and measurement problems, of productive efficiency. This reveals that, while the concept is appealing to some, serious doubts can be expressed about its use as an operational tool. Therefore, in parts two and three of this paper, approximations to productive efficiency (comprising sets of partial indicators) are assessed as possible schemes of regulation. The second part discusses the potential usefulness of the performance indicators published by BR as devices by which its subsidy might be regulated. The final part considers the relevance of the scheme of regulation at Amtrak to BR. These schemes have differing emphases: the BR indicators focus primarily on efficiency of use of *inputs*, while in the Amtrak scheme, the quality of service (*'outputs'*) predominates. The schemes are not mutually exclusive, but concentration on their different emphases represents a convenient classification for the purposes of discussion. Overall, this paper finds that such schemes offer the means of obtaining tighter regulation of a subsidised state monopoly, such as BR. However, effective implementation entails radical changes in the relationships between the industry being regulated and the regulatory authority.

The nature and measurement of productive efficiency

Productive efficiency can be broadly defined as the minimal use of physical inputs to achieve a given level of production or service. Therefore, this concept has an apparent direct relevance to the problem of ensuring efficiency in, and providing management objectives for, BR's subsidised passenger services. A wider interest in the concept has arisen because of serious doubts expressed in the literature over a fundamental assumption of economic theory, i.e. that firms organise themselves as efficiently as possible, such that their costs are minimised. A critical influence in the challenging of this assumption has been that of Leibenstein (1966). He argued that many firms do not operate at, or near, their production possibility frontier, but at some lower level of output. He attributed this to the absence of pressures to be efficient. Leibenstein focused primarily on the *use* of (and not the prices paid for) production inputs and the pressures (internal and external) on management to organise efficiently (pp. 406–7). He designated the avoidance of such waste as 'X-efficiency'.⁵ Such ideas have gained support in the literature and as a part of government policy towards the state industries.⁶

⁵The designation of X-efficiency was first made by Leibenstein; however, other contributors to the literature have introduced similar concepts. Thus, X-efficiency has a great deal in common with Cyert and March's (1956) behaviouralist notion of organisational slack, which refers to the non-optimal use of resources, because management only seeks some minimum level of attainment. The Leibenstein concept is also akin to Averch and Johnson's (1962) hypotheses on management behaviour in a regulated firm. They found that managers behaved non-optimally in organising the productive resources at their command, largely because of the failure of the regulatory process as a substitute for competitive market structures.

⁶It has been suggested that X-efficiency is so important that it is not possible to discuss the regulation of monopoly without taking its potential impact into account (Peacock and Rowley, 1972). Also, in relation to the nationalised industries, Pryke (1971), in a comprehensive study of their economic performance, argued strongly for the relevance of X-efficiency in any such appraisal. The arguments which he made were the same as those of Leibenstein. They were expressed specifically regarding the railways and also regarding the nationalised industries as a whole (Pryke, 1971, *passim*, but see pp. 396–398, in particular). Furthermore, institutional pressures exist in the UK which support this line of thought. Its importance in the context of the regulation of nationalised industries has been advocated by the Government in its White Papers of 1967 (HM Treasury, 1967, para 32) and 1978 (HM Treasury, 1978, para 77). and by the NEDO (1978), in its report to Government on the regulation of the nationalised industries. While the impetus for these Government recommendations has its roots in the type of arguments advanced by Leibenstein, no reference was made to him, nor to his concept of X-efficiency. Indeed, the interpretation of productive efficiency made by the Government is less narrow, in that it not only emphasises the need for efficiency, but also placed considerable stress on cost control.

However, reservations have been, or can be, expressed over:

- (i) its applicability to BR;
- (ii) the quality of empirical evidence in support of X-efficiency; and
- (iii) whether it is possible to construct an operational measure of X-efficiency for BR's passenger operations.

These issues are considered, in turn, below.

(i) *The Applicability of X-efficiency to BR*

In the first instance, it has been argued that the concept of X-efficiency overemphasises supply. Stigler (1976) demonstrated that Leibenstein emphasises the additional output which would be produced if organisations operated at the highest levels of technical efficiency, but this ignores the existence or otherwise of sufficient pressure of demand for such additional output. Thus, X-inefficiency is most applicable in the case of monopolies which restrict output. However, while BR is a state monopoly, it is certainly not a monopoly in the sense of being the single producer of a product or service for which there is no close substitute. While a state monopoly of rail transport, by its very nature, eliminates intra-modal competition for passenger and freight traffics, it certainly does not dispense with inter-modal competition. Indeed, there is considerable evidence that the transport market is competitive.⁷ An exception to this is the recent report of the Monopolies Commission which suggests that BR has a considerable degree of monopoly power in the provision of railway commuter services in the South East of England (Monopolies Commission, 1980).

Since BR's monopoly power is, at best, uneven, it might be argued that the existence of productive inefficiencies is also likely to be uneven. On the other hand, it might be argued that, regardless of whether BR is in a competitive trading position or not, if it is state-owned, it will be insulated from the full rigour of competitive pressures. Therefore, it might very well be that there is already some degree of X-inefficiency at BR, despite the competitive pressures that it faces.

(ii) *Evidence of X-efficiency*

This uncertainty over the extent, or, indeed, over the existence of X-inefficiency is not confined to BR. This can be seen from the evidence cited by proponents of the pursuit of X-efficiency. This takes two forms: (a) studies of the level of mon-

opoly in the economy: these are accompanied by inferences about the loss to the economy as a whole caused by monopolies restricting output versus the gains to be achieved by all firms eliminating X-inefficiencies; (b) examples of instances where X-inefficiencies have been found.

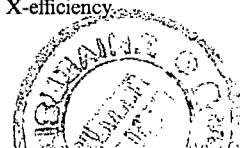
The former evidence is not conclusive. Indeed, it has been a matter of dispute for many years.⁸ The second aspect of this evidence is directly relevant to the problem of identifying existing X-inefficiency at BR. The evidence represents the findings of one-off case studies, in which some change is made (for example, new management, the adoption of well-known technology several years after other firms) that results in marked increases in output or reductions in cost. This is one of Leibenstein's (1966) principal sources of evidence for X-efficiency. However, in the latter form of evidence, the existence of X-inefficiency is not known until *after* the event which triggers off the drive to higher levels of productive efficiency. Furthermore, the instances of X-inefficiency cited by Leibenstein were of a sporadic nature. These attributes of the cases of X-inefficiency—its *ex post* and unpredictable nature—make it difficult to incorporate it in the financial objectives of any firm, regulated or otherwise.

(iii) *An Index of X-efficiency*

One means of overcoming this criticism would be the construction of an index of X-efficiency. This could then be used to set targets (in conjunction with financial objectives), and their attainment or otherwise might be used as a basis of regulating subsidies. However, such an index is elusive. In-

⁸Thus both Leibenstein (1966) and Pryke (1971) cite a study by Harberger (1954) as evidence of the importance of X-efficiency in the economy as a whole. However, this conclusion must be interpreted with caution both because of the inferences drawn from this study by Leibenstein and Pryke and also because of the controversy over Harberger's study *per se*. Both of these writers interpreted Harberger's study as concluding that restriction of output from monopoly is minimal and, therefore, X-efficiency is of the utmost importance. However, there is an inconsistency in this interpretation as the level of X-efficiency (in terms of Leibenstein's arguments) is largely determined by the extent to which external pressures to be efficient exist. Thus, if there is not a significant number of monopolies, this might indicate a relatively competitive economy, which would presumably result in external pressures on management to be efficient. Indeed, Harberger concluded that economists need not "apologise for treating (the US) economy as competitive, for in fact it is awfully close to being so" (p. 87). This suggests that X-inefficiency is not widespread. However, such a conclusion must be treated with care. Harberger's study has proved contentious; at the time of Pryke's study, conflicting evidence had been presented by Schwarzman (1960) and Scherer (1970), who both supported Harberger, and by Stigler (1956) and Kamerschen (1966), who discovered significant welfare losses associated with monopoly. Most recently, Cowling and Mueller (1978) have produced evidence which contradicts that of Harberger. Therefore, this type of evidence does not provide conclusive evidence on the importance of X-efficiency.

⁷Thus, numerous investigations of UK transport have reported that BR is in a competitive trading position. These include studies by Pryke (1971); Thomson and Hunter (1973); Independent Commission on Transport (1974); Pryke and Dodgson (1975). Also, more theoretical analyses have reached similar conclusions. See, for example, Foster (1975) on all rail traffics, Dodgson (1981) on freight transport.



deed, as is shown below, the measurement problems involved result in the production of what is, in effect, a crude version of information already present in the profit and loss account.

This can be demonstrated as follows. Thus, if E is denoted as productive efficiency, θ_i are outputs, I_j are inputs and an asterisk denotes optimality:

$$E^* = \frac{\theta_i}{I_j}$$

In this simple formulation of productive efficiency, severe difficulties arise over the determination of both θ_i and I_j . Under the terms of Leibenstein's analysis, this must provide a signal where resources are being used inefficiently, with the consequent effect that costs are too high.⁹ This is a two-stage analysis: (a) an index is required which expresses, in non-financial terms, the level of X-inefficiency and (b) this level of inefficiency is compared with costs incurred, to determine if they are excessive.

As regards (a), there are two fundamental drawbacks to the measurement of θ_i and I_j on the same scale (unless it is in financial terms), i.e. the *heterogeneity* of both inputs and outputs and the vintage of long-term resources used as inputs. Thus for θ_i , the most evident physical measure is that of passenger miles. However, within the broad category of 'passenger traffic', there are wide variations which undermine the meaningful aggregation of passenger miles. For example, there is first class and second class travel; peak and off peak services; high speed trains and commuter trains. As a consequence, 'passenger traffics' can only be usefully combined in £s, preferably with weights to allow for the different composition of each type of traffic.¹⁰ Nevertheless, while a physical measure of θ_i , railway passenger output, cannot be meaningfully derived, it might be considered that the

financial one might be of use in measuring E .¹¹ This could be combined with a non-financial measure of I_j which might permit the construction of an index with which to monitor the X-efficiency of inputs. However, the measurement of I_j in anything other than financial terms represents even greater difficulties than those of θ_i . Therefore, of the two principal inputs to railway services, i.e. labour and the use of capital assets, there are substantial differences between and within these groupings which make their aggregation into an overall measure of inputs a dubious exercise.

Thus, a statistic for the labour input, such as man-hours or total number of employees, masks the range of different grades of employees utilised on the railways. Similarly, within BR's capital assets there are evident major differences between permanent way and rolling stock. Also, there are significant differences between the locomotives which comprise BR's rolling stock. For example, the high speed train is obviously quite different in its operating characteristics from shunting vehicles, diesel engines or electric trains. Furthermore, even if the physical aggregation of the use of the principal assets of the railways were possible, this would ignore the *vintage* of the different assets involved, thereby distorting E from one period to the next.

Overall, therefore, while the proponents of the importance of X-efficiency write as if this is a single, unifying concept, the problems involved in its measurement confound its use in this way. Nevertheless, this does not eliminate the use of productive efficiency indicators from the financial regulation of BR. As will be shown in the following section, a more pragmatic interpretation of productive efficiency has evolved in response to Government pressure on state industries. While the indicators constructed for this purpose are not without defects, they do point the way to a means by which tighter regulation of BR's subsidised passenger services *might* be achieved.

Partial measures of productive efficiency: inputs

The performance indicators published by BR, in line with Government recommendations, are set out in Table 1, in a classification which highlights their financial and non-financial aspects. All such indicators published by BR are included in this table, although those of most concern here relate to passenger services. Both the financial and non-financial indicators relevant to passenger services represent a summary of the operating profit or loss for that part of BR's services. Thus, for passenger services, indicator (1) is a measure of passenger

⁹That is, by not spreading costs over a larger attainable output or by using too many resources to achieve the existing output.

¹⁰This problem also applies to freight traffic and, to a greater degree, in any attempt to measure θ_i for all railway services. Thus, for all railway services, the most evident physical measure of θ_i is that of 'traffic units', i.e. a simple aggregation of the basic rail statistics of ton miles and passenger miles. However, this is not a meaningful measure of θ_i , as significant differences exist between the two mainstream activities of freight and passenger traffic and within each of these groups. There is great time and effort involved in loading and unloading freight, which is not applicable to passenger services where the 'cargo' voluntarily embarks and disembarks. Also, the freight statistic of ton miles imparts a bias, as freight traffic might be expected to be heavier than passenger traffic. Similarly, within these two major activities, there are wide differences. The variations within passenger traffic have been noted in the main text. Similar variations exist within the broad category of 'freight traffic'. Thus freight has bulk goods such as coal and iron ore, but also sets of individual items of high value, such as motor vehicles. As a consequence, freight and passenger traffics can only be usefully combined in £s, preferably with weights to allow for the different composition of each type of traffic.

¹¹As proposed by Sorenson and Grove (1977) in the context of 'not-for-profit' organisations, in which similar problems exist over the measurement of θ_i .

Table 1
British Rail's Performance Indicators*

Indicator	Operating services		
	(a) Passenger	(b) Freight	Permanent Way
<i>Financial</i>	(1) Average fare per passenger mile	(6) Freight revenue per wagon	(9) Track maintenance costs per track mile
	(2) PSO 'contract' payment per passenger mile	(7) Train running and terminal costs per loaded train mile	(10) Signalling renewal and maintenance costs per track mile
	(3) PSO 'contract' payments as a percentage of GDP at factor cost	(8) Revenue per £1,000 of paybill costs (rail and rail workshops)	(11) Total administration costs per loaded train mile
	(4) Passenger business direct costs per loaded passenger train mile		
	(5) Revenue per £1,000 of paybill costs (rail and rail workshops)		
<i>Non-financial</i>	(12) Passenger miles per loaded passenger train mile	(17) Average wagon load (all traffic including freight-liner and NCL)	(21) Loaded train miles per route mile
	(13) Passenger trains arriving on time, or less than 5 minutes late, as a percentage of total passenger trains	(18) Net tonne miles per loaded freight train mile	
	(14) Passenger trains cancelled as a percentage of current timetable services	(19) Loaded train miles per train crew member (i.e. freight and passenger)	
	(15) Loaded train miles per train crew member (i.e. freight and passenger)	(20) Net tonne miles per member of staff employed (rail and rail workshops)	
	(16) Passenger miles per member of staff employed (rail and rail workshops)		

*Compiled from BR Annual Report and Accounts, 1981, pp.80-81.

receipts; (2) and (3) are measures of the magnitude of BR's subsidy; (4) and (5) relate to operating costs.

As for the non-financial indices, these might be seen as (approximate) mirror images of certain of the financial indicators. Thus, as regards passenger services, non-financial indices (12), (13) and (14) (which relate to the average passenger load per train, the punctuality and the reliability of services), provide insights into the nature of passenger receipts, and items (15) and (16) can be related to the major operating cost of labour. Similar obser-

vations can be made regarding freight services.¹² Finally, the effective use of routes (indicated by (21), the single non-financial indicator relevant to permanent way) can be related to the costs associated with permanent way, as indicated by items (9), (10) and (11).

Therefore, these indicators (financial and non-financial) for passenger services reflect both inputs (labour and capital) and outputs ('quality of service'). However, in the following discussion of how the indicators might be of use to a regulatory authority, the primary focus is on the efficient use of *inputs* in the provision of whatever volume of services is actually achieved. Thus, the potential contribution of indicators relating to the quality of outputs (such as the non-financial indicators of the punctuality and reliability of passenger services) is merely noted at this stage. This is not because it is

¹²Thus, for freight services, (6) is a measure of freight receipts; (7) and (8) are measures of freight operating costs. Also, non-financial indicators (17) and (18) (which relate to the tons carried per train and to the efficiency of its carriage), can be related to freight receipts. Non-financial indicators (19) and (20) for freight services can be related to labour cost.

believed that they are unimportant, but because they are an incomplete measure of the quality of railway passenger services. Also, this topic is discussed below, in the section on partial indicators of passenger output.

The remaining non-financial indicators in Table 1 should be of interest to a regulatory authority which is intent on the elimination of productive inefficiencies, as they provide information on the use of the key inputs of labour and capital. However, they have a major drawback as devices for tighter financial regulation: they lack sufficient detail to allow more than very broad guidance on railway operations. The issues involved are discussed below for (i) labour inputs and (ii) capital inputs.

(i) *Labour Inputs*

As regards *labour* inputs, non-financial indicators (16) and (20) imply that, for a given level of output (passenger miles/net tonne miles), the precise size of labour force required is *known*. However, the approximate nature of these indicators suggests otherwise. In the first instance, indicators (16) and (20) use total staff employed as their measure of labour inputs, but this fails to distinguish between the different types of labour employed by BR. Furthermore, as total staff employed is used as the measure of labour inputs in both (16) (for passenger) and (20) (for freight), these indicators fail to indicate the respective contributions made to passenger and freight services by the labour force. While indicators (15) and (19), i.e. loaded train miles per train crew member, show more refinement by separating train crew members from the other members of staff, these still fail to distinguish between the respective contributions of train crews to passenger and freight services.

These two types of indicators are so crude, as measures of labour inputs required for a given level of service, that their use by a regulatory authority would be likely to result in the employment of arbitrary standards. Indeed, there is considerable evidence that labour inefficiencies *do* exist at BR which are not revealed by indicators (15), (16), (19) and (20).¹³ However, some refinement may be possible. A closer examination of the working practices of BR's labour force could provide the necessary information. Therefore, the regulation of

BR might be tightened by linking it to the elimination of identified inefficiencies in working practices.

However, as a consequence of specifying what constitutes an efficient use of labour, the regulatory authority is drawn into the details of operational management. This represents a radical change of emphasis in existing formal relationships between BR and government. At present BR, as a public corporation, is autonomous, although it must take account of the views of government. Thus, the *status quo* is that government should not become involved in day-to-day management, but should be concerned at the policy-making level. However, if the above change of emphasis were pursued, the degree of detail and direction required in decisions on the best use of labour would be such that there would be a virtual takeover of management's function by the regulatory authority. This outcome would also apply to capital inputs, as discussed in the following section.

(ii) *Capital Inputs*

As regards *capital* inputs, the non-financial indicators in Table 1 highlight the load factor for passenger services (12) and the use of the rail network (21). These are of crucial importance in determining the efficiency of BR. Thus, the higher the load factors, the more likely is it that BR will be using resources efficiently and spreading its costs over higher outputs. Similar observations can be made regarding the use of the rail network. However, the improved regulation of the railways cannot be achieved by simply linking a financial objective to specified levels of load factors and/or the use of the rail network in a fashion which eliminates productive inefficiencies. The major difficulty in such an exercise is the specification of 'acceptable levels' of efficiency of capital inputs, as expressed by non-financial indicators (12) and (21). There are several ways in which such 'acceptable levels' of efficiency might be determined: (a) railway management might specify its view on attainable levels for indicators (12) and (21), (b) reference might be made to comparable ratios for other railways, and (c) BR's existing indicators might be supplemented with additional information on railway operations. However, none of these is without its defects.

Alternative (a) is too reliant on railway management to be of use to a regulatory authority. It allows management to devise its own yardstick of success or failure. The evident lack of objectivity in such an arrangement undermines its usefulness. Indeed, strictly speaking, this approach is geared to assessing the 'effectiveness' (i.e. degree of attainment of a specified goal) rather than the efficiency (i.e. minimal use of inputs for a given level of output) of the railways. As such, the goal of eliminating productive inefficiencies need not

¹³The most recent evidence of this is the industrial disputes over the introduction of flexible rostering at BR (see, for example, *Economist*, July 24, 1982). However, numerous other improvements in working practices have been suggested for BR for many years. For example, the introduction of more payguards on trains, dispensing with freightguards (particularly where the train is lightly loaded or has power doors) and the introduction of automatic ticket barriers, thereby saving on ticket collectors (see, for example, Pryke and Dodgson (1975), p. 116).

form part of management's definition of 'acceptability'. Thus, the scope for inbuilt inefficiencies or 'organisational slack' could influence management's view of 'attainability', as expressed by these indicators.

Alternative (b), reference to other railways, is similar to the proposed solution for the assessment of the efficiency of labour. However, the efficiency of asset utilisation is less amenable to this approach. Indeed, the difficulties of international comparisons are well known: *geographical* (reflecting the different patterns of concentration of population and production: the maximum length of haul of freight, as limited by the country's size; the differences between through transits between countries on continental rail networks as opposed to an isolated island network in the UK); *historical* (as evidenced in the different development of inland transport systems, for example, a greater reliance on inland waterways in certain European countries); and *managerial/institutional* (as demonstrated by the differences in the quality and types of rolling stock and permanent way used by management, as constrained by the availability of funds at the institutional level). As a result, there is no readily identifiable railway which might serve as a specific reference point in the regulation of BR.

The final alternative, (c) above, was to probe behind management's notions of attainable levels of load factors and route utilisation. There is potential for the use of greater detail in such assessments; for example, information on the density of rail operations in terms of time (peak v. off peak, seasonal fluctuations) and geographical location (branch lines, inter-city routes). If these details of the flow of traffic were combined with those on the type of rolling stock used for different traffics (diesel, electric, multiple units) and the rate at which it moves, a more accurate picture would be obtained of the efficiency with which capital inputs are used. Also, in par, the load factor obtained will be influenced by the quality and condition of BR's rolling stock and the state of repair of the permanent way. In the event of inefficiencies being pinpointed by such information, this might lead to their elimination, for example, by rescheduling of services or of types of rolling stock. However, in seeking such information and setting standards of attainment based upon this alternative, the regulatory authority would be drawn into the details of operational management, just as it would be in the case of labour inputs.

Partial measures of productive efficiency: outputs

This section discusses the possibility of regulating BR's subsidised passenger services by using

non-financial indicators of 'quality of service'. The indicators discussed here are those advocated by Baumol (1975) for Amtrak, in the USA. They are specifically aimed at the quality of service of subsidised passenger operations provided by US railroads on behalf of Amtrak. Under this arrangement, standards are set for specific aspects of 'quality of service', and payment of subsidies is dependent upon their attainment.

In this scheme, 'quality of service' has two components, passenger comfort and the timeliness of services provided. The factors comprising each of these aspects are set out in Table 2. Those which are used for passenger comfort are self-explanatory. This is also true of the definition of 'timeliness', with the exception of two factors: (2) 1(b), 'marginal incentive bonuses' and (2) 2, the 'excess delay tolerance parameter'. The first of these refers to 'bonus' subsidy payments of fixed amounts for every percentage point by which a given railroad exceeds its 'base standard' of timeliness. This base standard is a specified percentage of trains which arrive on time. The second, the 'excess delay parameter', refers to an allowance for delays in journey times. Specifically, a train is defined to have arrived at its final destination on schedule if it has fallen behind by no more than five minutes for every hundred miles it has travelled, with a maximum tolerance of 30 minutes, no matter what distance it has covered (Baumol, 1975, p. 289). As for the applicability of this scheme to BR, reservations might be expressed regarding (i) the appropriateness of the indicators and (ii) its rationale.

(i) Appropriateness of Indicators

There are two criticisms which might be made against the usefulness of the Amtrak 'quality of service' indicators. In the first place, a major reservation expressed regarding the partial measures of productive efficiency discussed in the previous part of this paper also applies to these indicators. Specifically, the setting of standards always carries the potential cost of built-in organisational slack. In the context of the indicators in Table 2, therefore, this criticism is relevant to (2) 1(a), establishing a base standard for timeliness; (2) 2, the 'excess delay' tolerance parameter; (2) 3, scheduled trip times and R, the rate for the train; and (2) 4, the level of plant required to meet peaks in demand.

Indeed, there is evidence that US railroads regulated by this scheme have built-in organisational slack. Thus, an investigation (GAO, 1977) revealed that no railroads responded to the 'schedule improvement' incentive and that incentives were predominantly paid for schedule adherence. This report found that railroads modified schedules to make them easier to observe. Thus as punctuality was only measured in terms of final destination,

Table 2
Non-financial Indicators of Quality of Service

(1) <i>Passenger Comfort:</i>	
<i>Indicator</i>	<i>Basis of Subsidy Payment or Deduction</i>
1. Carriage cleanliness	The cost of cleaning a carriage.
2. Equipment operability	Required attributes: (i) One carriage for a complete journey, without breakdown (ii) Temperature, t , must be within the range, $62^{\circ} \leq t \leq 82^{\circ}$. (iii) Sufficient light for reading.
(2) <i>Timeliness of Services Provided:</i>	
<i>Indicator</i>	<i>Basis of Subsidy Payment or Deduction</i>
1. Schedule adherence	(a) Base standard for timeliness. (b) Marginal incentive 'bonuses'.
2. Excessive delay	(Actual time of trip—scheduled time—'excess delay' tolerance parameter)
3. Schedule improvement	$\left(T \times \frac{M}{\text{Sch.}T} \times R \right)$ where: T = no. of trips for train whose schedule is improved. M = no. of minutes eliminated from schedule. Sch.T = scheduled trip time in minutes. R = rate for the train (as specified for given routes).
4. Equipment availability	A target for the number of spare locomotives and carriages required to maintain scheduled services.

Compiled from Baumol (1975).

railroads inserted 'slack' in the schedules approaching that destination, such that trains could arrive 'on time'. Indeed, Amtrak's average speed fell from 51.5 miles per hour in 1971 to just over 45 miles per hour in 1977. This is just one aspect of the possibility for such slack.

Another, potentially more important, matter is the extent to which such indicators can meaningfully be used as a basis of subsidy payment. This is particularly because of the extent to which such subsidy payment is contingent upon factors beyond the control of railway management. This varies from the frequency with which trains are cleaned, which is controllable, to the effects of adverse weather conditions. A further aspect of this issue of the degree of influence which management can exert is the state of equipment used. This could significantly influence both the degree of passenger comfort and the timeliness of services provided.

In the case of BR, not only has a set of non-financial criteria similar to that in Table 2 been produced, but BR has also requested an additional £890 million (1979 costs) to attain such standards in its London and South Eastern services (BR, 1979). Therefore, the size of subsidy might depend upon the 'quality of service', but the 'quality of

service' depends upon the size of the subsidy. Indeed, this type of interdependence is highly likely to arise where the subsidy received for such services is a major source of their finance.

(ii) *The Rationale of Amtrak's 'Quality of Service' Indicators*

Not only can doubts be expressed about the usefulness of the 'quality of service' indicators in this scheme of regulation, but there are also doubts concerning its underlying rationale. The major issue here is the nature of the market to be served. In the case presented for the Amtrak scheme, Baumol (1975, p. 282) makes explicit reference to the potential usefulness of quality of service indicators in the context of a regulated *monopoly*. If the monopolist is profitable, the case for preventing it from exploiting its monopoly power by reducing the quality of its service is evident. However, the case for their use in *subsidised state monopolies*, such as Amtrak (and, indeed, BR), is complicated by the existence of competitive pressures.

Thus, it has been suggested above that BR does face competition, despite its being designated a 'state monopoly'. It is shown below that a similar circumstance holds for Amtrak. However, the nature of such competition is crucial in determining

the importance to be attached to 'quality of service' indicators. Thus, the emphasis placed on 'quality of service' at Amtrak reflects a belief that there is a need to redress the imbalance in US railway services caused by railroads concentrating on the more profitable freight services at the expense of the quality of passenger services (Baumol, 1975, p. 282). However, the argument that Amtrak should therefore stress 'quality of service' to regain passengers implies that it operates in a monopolistic market. Under these circumstances competing firms vie for custom by seeking to differentiate their product or service from their competitors. In this way, concentration on quality of service might offer a means of Amtrak winning back customers from its competitors.

However, there is evidence that this is a misinterpretation of the nature of Amtrak's market, and that price competition is of greater importance. First, there is a report commissioned by, and presented to, Amtrak during its first year of operation; and secondly, there is an examination of Amtrak's experiences since its creation.

As regards the first piece of evidence, the questions contained in a survey of existing and potential inter-city travellers by train, plane, car or bus were predominantly concerned with the detection of attitudes towards 'quality of service' (Harris, 1972). However, this report revealed that the 'quality of service' considerations which ranked highly with travellers were generally those which are inherent in public rail transport. Thus, the major advantages of rail travel were considered to be (a) the ability to look at scenery (41% of sample); (b) the ability to walk around—not confined to one's seat (26%); (c) there is no need to drive, it is possible to relax and sleep (24%). On the question of disadvantages, 39% of the sample thought trains were too slow, but there were no other such disadvantages on which a significant proportion of the sample concurred. Of the attributes identified as being of major importance, therefore, only 'timeliness' is one which a railway could improve upon to attract passengers.

However, the significance of timeliness of railway operations has to be placed into context. In particular, the relative importance of this factor has to be assessed in relation to sensitivity to prices. There are three pieces of information within this study which suggest that the price of travel is of considerable, perhaps of the utmost, importance to Amtrak's travellers. First, within the 'advantages' of rail travel, only 13% of the sample considered it to be inexpensive—an indication of high prices relative to other modes. Secondly, in response to a question on whether travellers would go by train if it cost 20% less than air, bus or car, 49% of the sample said they would travel by train. This contrasted with 37% of the sample who would have preferred the train option on the basis of the

costs of the competing modes at the time of questioning. Furthermore, in addition to this indication of price elasticity of demand, 63% of the sample rated the cost of the trip as the dominant consideration, in a question on the most important factors in choosing how to travel.

Indeed, these pointers to price competition are supported by Amtrak's own subsequent experiences. Thus, it has calculated an elasticity of demand for single fares (based on all its markets and all the regions it services) of -2.2 (Hilton, 1980, p. 37). A breakdown of this figure, geographically and by type of journey, also reveals high price elasticities, which reflects the abundance of alternative modes in all its markets. Amtrak has also found relatively high cross-elasticities of demand with other modes, measured as the percentage change in passengers carried by either mode, after a 1% change in fare of the other (Hilton, 1980, p. 37). These findings are consistent with the experiences of BR, as noted above.

All of this points to markets in which price competition is of great significance. As a consequence, the potential importance of 'quality of service' indicators (i.e. relative to financial measures) to a regulatory authority is diminished. Indeed, to the extent that such price competition exists, it might be presumed that existing regular passengers are satisfied (as revealed by their willingness-to-pay) with the quality of service, without recourse to its detailed measurement and regulation in the manner prescribed for Amtrak. It is instructive to note, for example, that in the Harris survey, 71% of the regular train travellers were satisfied with the price they paid; 68% were satisfied with their personal comfort; and 89% were satisfied with their safety. In general, these travellers were satisfied with both price paid and quality of service, with minor exceptions (for example, 32% considered that they were not offered 'good food at a reasonable price' (Harris, 1972, p. 31).

Prima facie, these findings appear to be inconsistent with those of BR, in the above-mentioned survey of commuters in south-east England. In that study, existing commuters expressed dissatisfaction with the quality of BR's services. This suggests that 'willingness-to-pay' (and, thereby, financial measures) cannot be used as a measure of consumers' satisfaction with the quality of railway services. However, as noted earlier, this regional market is one in which BR has been described as having monopoly powers (Monopolies Commission, 1980). This is quite different from the (price) competitive nature of most BR (and Amtrak) markets, in which willingness-to-pay might be accepted as a measure of consumer satisfaction. Indeed, it is quite possible that the poor quality of service reported upon in BR's survey might be a reflection of exploitation of monopoly powers. For example, it might have used its most modern

equipment (such as high speed trains) on competitive inter-city routes, at the expense of the quality of service in its 'captive market' commuter services. Therefore, BR's survey is not necessarily inconsistent with the Harris study.

Overall, therefore, the usefulness of the Amtrak's 'quality of service' indicators might be summarised as follows. On the one hand, these indicators might be of some use in the regulation of a profitable monopoly (national, regional or local; state-owned or private). *Caveats* to their use in this manner are (a) the potential for built-in organisational slack and (b) the detailed information required to regulate 'quality of service'. These details are comparable to those required to use the partial indicators of the efficiency of inputs, as discussed in the previous part of this paper, with a similar, severe loss of autonomy of the regulated firm. On the other hand, in the situation of subsidised state monopolies in which there are elements of considerable monopoly power (for example BR's South-Eastern Region commuter services), there is a possible distortion of the very rationale of introducing subsidisation, contingent upon 'quality of service'. In this situation, there is a potential for the operator to divert resources away from markets in which he has monopoly power (thereby undermining the quality of its service) and to cross-subsidise services in competitive markets. Therefore, if such indicators were used in the regulation of this aspect of BR's operations, they would have to be handled with extreme care. Furthermore, in competitive markets in which price competition is the dominant consideration (such as those typically faced by BR and Amtrak), the potential importance of 'quality of service' indicators is substantially reduced on the grounds that prices paid (and, thereby, operating revenues) might be accepted as a measure of willingness-to-pay (and, thereby, satisfaction, to a greater or lesser degree, with quality of service). Nevertheless, if such services are in receipt of subsidy, it is evident that a regulatory authority might be interested in the economy with which resources are used in providing these services. This would entail consideration of partial indicators of the use of labour and capital, with all their attendant difficulties, as discussed in the previous part of this paper.

Conclusion

This paper has examined methods of improving the present system of subsidy payments at BR, a state monopoly. The existing system of subsidisation has attracted criticism on the grounds that it does not provide a precise enough financial objective for the management of subsidised railway services, nor does it provide a meaningful yardstick by which management's performance can be as-

sessed. Indeed, it could be argued that this financial objective is so imprecise that subsidised railway services operate inefficiently.

As a consequence of such criticism, it has been suggested that the system of financial regulation at BR should be reformed by linking non-financial indicators of productive efficiency to subsidy payments. This paper has examined the potential for such refinement of this aspect of BR's financial regulation in three stages. First, it was found that the construction of an operational overall index of productive efficiency, to which BR's subsidy payments might be related, was intractable. However, the second and third stages, which examined the potential for sets of partial indicators of productive efficiency to be used as regulatory devices, offered a possible means of improving financial regulation at BR.

The discussion of the first set of partial indicators was based on those non-financial performance indicators published by BR, in compliance with government policy. It was noted that these indicators provide a broad summary of BR's profit and loss account. As such, they lack the necessary detail to permit a tightening of the regulation of BR's subsidy payments. Furthermore, there is considerable potential for built-in organisational slack to undermine their usefulness. Therefore, greater information on their composition is necessary before they might be of use to a regulatory authority. While it was suggested above that such information could be obtained, it was noted that, in probing for the necessary details of railway operation to ensure that productive efficiency was being attained, the existing formal governmental nationalised industry relationships would be significantly altered. Indeed, it was suggested that the volume and depth of information required in the assessment of productive efficiency might lead to the regulatory authority becoming a form of 'shadow management'.

The second set of partial indicators considered was that used in the regulation of subsidy payments to Amtrak, in the USA. This scheme of regulation emphasises 'quality of service' measures. Its potential application to the UK is evident: it offers a possible means of providing a definition of the 'level of passenger service', as introduced by the PSO subsidy in 1975. In this respect, the Amtrak scheme's emphasis on outputs complements the first set of partial indicators, which concentrated on the efficient use of inputs. However, similar reservations can be expressed about this scheme as those noted regarding the first set of partial indicators, i.e. the potential for built-in organisational slack and the volume of detailed information required for effective regulation. Also, certain of the 'quality of service' indicators were beyond the control of management and, therefore, had little to offer as means by which

their efficiency might be assessed. This circumstance was exacerbated by the likelihood of interdependencies between both the quality of service and the size of the subsidy payment. Perhaps the most important reservation of all, however, was that the rationale for such an approach was more consistent with a profitable, privately-owned monopoly, actively exploiting its monopoly powers, than with a subsidised state monopoly facing severe competition. On the other hand, 'quality of service' indicators could be of use in regulating subsidised railway passenger services where local or regional monopolies exist. This might prevent railway management from exploiting its monopoly powers and cross-subsidising other services in competitive markets.

Overall, therefore, there is potential for the use of a policy of regulating subsidised railway passenger services by the use of non-financial indicators derived from notions of productive efficiency. Such a scheme of regulation could overcome the criticisms of the existing system of holding BR accountable for such services, which is based on purely financial criteria. However, it must be stressed that a policy of making subsidy payments contingent upon specified levels of non-financial indicators would entail a radical change in the relationship of BR to its regulatory authority, the Department of Transport. While it has recently been suggested that the very act of nationalisation results in a loss of autonomy for the management of the industry concerned (Davies and McInnes, 1982), this form of regulation is liable to have even more far-reaching effects. Thus, if this policy is to be effective, it is highly likely that the regulators will become deeply involved in the details of operational management. Paradoxically, this course of action might serve to further undermine the very financial criteria which are the source of difficulty, as it would then become increasingly difficult to isolate the effects of managerial and regulatory influences on reported financial results.

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Announcement

Financial Reporting to Employees: Towards a Research Framework*

N. Lewis,
L. D. Parker
and P. Sutcliffe

Introduction

While the practice of corporate financial reporting to employees is by no means a recent phenomenon, it has experienced a marked resurgence during the past decade. For the purpose of this paper, a corporate financial report to employees is defined as a separate report produced independently of any other document or as a supplement in a house journal. This report is issued at least annually and usually contains the chairman's message, simplified financial statements and commentary on the activities for the period. Other inclusions can be plans, forecasts and personnel-related information.

Both corporate 'in house' experiments with such reports and the incidence of published works on the subject have multiplied. Much of this work, however, has been characterised by conjecture about reasons why management might produce financial reports to employees and the description of results of *ad hoc* surveys of management and employee attitudes to such reports. A review of publications indicates that employee preferences have been neglected by many report producers and many accounting writers. This paper is concerned to focus attention upon employee preferences.

The literature of the 1970s discussed many potential reasons for financial reporting to employees. However, the extent to which these observations formed the basis for a theory received little comment until the 1980s. Craig and Hussey (1982, pp. 8, 9) suggest that if any theory of financial reporting to employees exists, that theory is founded on the following four principles either individually or in some combination.

1. 'Management has obligations' to supply employees with information about the financial state of the business.

2. Employees 'demand' information about the financial state of the business.
3. It is in management's interests to supply information to employees in order 'to bring about an improvement in individual performance'.
4. It is in management's interests to supply information to employees in order 'to create the impression of a progressive management style'.

Principles 1, 3 and 4 are clearly supply driven, with numbers 3 and 4 emphasising satisfaction of management objectives, and number 1 recognising a vague concept of social responsibility. Principle 2 recognises employee preferences.

Any argument that financial reports to employees are prepared as a response by management to employee demands must be dependent on two fundamental questions:

- (a) Do employees demand financial information?
- (b) Are costs to management of responding to these demands less than the costs of not responding, so that financial reports to employees will reflect the information demands of employees?

This paper sets out to provide a research design for investigating the question of whether employees demand corporate financial information—if so, what information they require,—if not, the possible reasons for their lack of interest in such information. Much of the existing literature discusses potential benefits to management, arguing that benefits outweigh costs. While not denying or limiting the importance of such supply-side issues as exhibited in principles 1, 3 and 4 above, this paper focusses upon the neglected issue of employee preferences for information. Accordingly a series of general propositions concerning employee demand for corporate financial information is constructed. This is intended to provide a foundation for future specifications of empirically testable hypotheses. The propositions constructed in this

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paper are concerned with (a) employees' 'demand' for financial information for decision-making purposes and, therefore (b) the extent to which financial reports to employees reflect employee information preferences.¹

Such a demand oriented approach is subject to a number of limitations. These have been discussed by Cooper and Essex (1977, pp. 202–206) as follows:

- (a) The lack of a single operational measure of employee utility.
- (b) The difficulty in synthesising competing individual desires into a consensus about desired information.
- (c) The cognitive limitations and the limited information-processing capacity of an individual employee.

A further constraint upon the employee utility function is the timing of employees' desire for the information. Reports issued annually tend to be of a static nature, while individual desires are of a dynamic nature.

Historical background

Reporting to employees is not a new phenomenon. The existence of employer–employee relationships is well documented, although the nature of those relationships has changed from period to period, as have the commercial structures in which they existed.

During the middle ages a master–servant relationship existed; the employee belonged—almost literally—to his employer. Communication of information to the servant was direct: the master would provide both craft instruction and certain information relevant to the commercial operation of that craft personally to the employee (Cipolla, 1973). The industrial revolution brought with it a general increase in organisational size and structural complexity which in turn required a proliferation and lengthening of internal communication channels.²

By the beginning of the 20th century, one of these communication channels took the form of a house journal reporting mainly social or personal data. These were 'devised to offset the lost healthy intimacy of 'shirt sleeve' days of workman and boss' (Botsford, 1923) and were considered a panacea

to 'sweep away disloyalty, unrest, inefficiency and strikes' (Saberson, 1920). The proliferation of these journals in North America was sufficient for Government Departments of Labor to survey and discuss their content.³ During the 1930s and 1940s the disclosure of financial information in the form of an 'employee report' as distinct from a 'house journal' became fully developed. The problems associated with the preparation of simplified and useful 'reports' relevant to employee needs and comprehension were examined in various journals.⁴ However the decline of such publications during the 1950s and 1960s (relative to the 1940s) could be taken as evidence of a waning interest in the problems of reporting to employees.⁵

Developments since the mid-1970s

During the 1970s, accounting literature in the Western World witnessed a rejuvenation of interest in the question of financial reporting to employees. Contributors to the literature on corporate financial reporting to employees since 1977 have primarily concerned themselves with analysing the incidence and nature of company efforts in this area. The first review of the incidence and type of reporting in Australia was published by Parker (1977a). This was an attempt to alert the Australian accounting profession to the significant foothold which this practice had already gained in Australian company affairs. Further descriptions of report practice and report contents have been published by Myers (1979), Taylor, Webb and McGinley (1979) and Marsh and Hussey (1979). This type of descriptive survey material has been allied with descriptions of report production and 'how to do it' expositions (Taylor, Webb and McGinley, 1979; Goodland, 1978).

Beyond the descriptive analyses of company reports, some work has been done in surveying a mixture of company managers and employees in the UK. Hussey (1978) conducted a survey which covered a restricted sample of 74 employees regarding their claims to readership, interest, comprehension etc. What employees *wanted* was de-

¹Whether such reports, even if they do reflect employee information preferences, can be comprehended, is a separate question again. This is considered in a forthcoming paper, 'An Analysis of Accounting Report Readability: Corporate Financial Reports to Employees, 1977–1980', by the authors.

²For discussion of the effects on communication of environmental complexity, see: Weick (1969, pp. 6–7), Wilensky (1967, p. 78), Woodward (1965, pp. 66–67), Davis (1967).

³Department of Labor, Canada, *Employee Magazines in Canada*, Bulletin No. 4, Industrial Relations Service, October 1921, Supplement to Canada Labor Gazette. A. Bezanson, *The Employee Publication*, Pennsylvania Department of Labor and Industry, Proceedings of the Industrial Relations Conference 1921.

⁴*Handbook of Industrial Relations*, Association of National Advertisers; *Harvard Business Review*, *Public Opinion Quarterly*; *Industrial Marketing*; *Cost and Management*; etc., during this period.

⁵For a detailed examination of international variations in interest over time in corporate financial reporting to employees refer to: Lewis, Parker and Sutcliffe, 'Financial Reporting to Employees: The Pattern of Development 1919 to 1979', *Accounting, Organizations and Society*, forthcoming.

duced from a mixture of employee, manager, researcher and practitioner views. Hussey and Craig (1980) conducted an Australian survey which concentrated upon company reporting: practices, reasons, costs and communication methods. It constitutes the first comprehensive attempt to assemble empirical evidence on employee attitudes to employee reports and their content. It is also worth noting that W. D. Scott and Co. (1977) published the results of a survey of Australian employees in 1977 which gave some views on form and content of reports desired by employees. The results of another broadly based survey of UK company practices in reporting to employees were published in 1975 by the British Institute of Management (Smith, 1975).

Other literature has focussed upon questions of the accounting responsibility for this form of reporting (Parker, 1977b), the likelihood of government regulation of reporting to employee practices (Webb and Taylor, 1980) and upon questions of why companies choose *not* to report financial information to employees (Hussey and Craig, 1980).

Apart from analysis of actual practices, and consideration and speculation about employee perceptions, references have also been made to the employees' 'moral right to know' and to the benefits accruing to management from such an exercise (Webb and Taylor, 1980). Their discussion of reasons for reporting, report definition, presentation and critical factors appear to parallel Parker's earlier conceptual research published in the UK (Parker, 1977c). An overview of recent literature is provided in Appendix 1.

A decade of marking time

Two observations can be made concerning the literature of the decade 1970–1979. First, there has been a lack of concentration upon employee needs and preferences. Much of the employee reporting literature of the 1970s focussed upon reporting to employees as an exercise in management propaganda rather than as an employee-oriented exercise. Lip service was paid to the concept that such a report is a device for mutual communication between various employee sectors of the organisation (Parker, 1977c), but, in the main, accounting writers have preferred to see the report as a mechanism for communication from top management down to employees.

Second, the empiricism that did occur was largely descriptive. Most of the accounting literature has been content to observe and describe corporate reporting practices and to speculate about employee requirements. Indeed it would appear that writers who considered the possibilities of government regulation (Webb and Taylor, 1980) and the reasons why companies do not report to

employees (Hussey and Craig, 1980) were somewhat premature in their concerns, given the dearth of reliable empirical evidence about employee needs and preferences. The empirical studies of W. D. Scott (1977) and Hussey (1978) must be recognised as useful pilot studies, but they used relatively small sample sizes and did not engage in any rigorous form of statistical analysis of survey results. The Hussey (1978) study tackled questions of employee interest, readership and comprehension. However, in studying preferences for report contents, it chose to mix employee preferences with researcher, management and practitioner opinions in some unspecified combination. The Hussey and Craig (1982) research replicated and extended the Hussey (1978) UK research, in Australia. These surveys have provided comprehensive employee response data, but do not formally address specified hypotheses and subject them to statistical testing.

The literature of the 1970s made little attempt to develop a theory based on employee demand for financial reports, and the surveys of the 1970s achieved limited success in identifying the specific information requirements of employees. Discussion of benefits to management established a *prime facie* case for the preparation and supply of financial reports to employees but added little to specifications of the content of such reports. In summary, then, the contribution of the 1970s literature tended to be fragmentary and inconclusive.

Other influences

By way of brief qualification, it must be remembered that the corporate report to employees is only one of a number of influences upon employee decision-making. Individual value systems (Kast and Rosenzweig, 1979, pp. 398–399), beliefs (Elbert and Mitchell, 1975, pp. 51–53), and employee attitudes (Parker, 1977c, p. 160) all affect employee decisions. Furthermore, individuals selectively perceive information and events (Kast and Rosenzweig, 1979, pp. 396–397) and adopt alternatives that support their preconceived ideas (Parker, 1978, pp. 193, 195). Social, work and political groups of which an employee is a member, can also influence decisions (Shull, Dulbecq and Cummings, 1979, pp. 127–165) to such an extent that the employee is likely to accept the group's interpretations of reality rather than the view offered by the company report (Deutsch and Gerard, 1965, pp. 402–411). The producers of employee reports should also recognise this bounded rationality of the decision-making employee. Employees may use irrelevant information, cling to an outmoded system of priorities, choose alternatives before seeking information, ignore consideration of costs and benefits, and so on (Elbert and

Mitchell, 1975, p. 131). Organisational information is but one input into the employee's decision system. Other influences and inputs may override it, supplement it or support it.

Future research

Accounting researchers have advocated that reporting financial data to employees is a valuable addition to the quality of corporate life, the benefits to management justifying the costs of disclosure. The credibility of such assertions has not been established. The specific benefits to employees and management which materialise as a result of reporting to employees have not been clearly identified and verified by empirical evidence.

Many papers have argued that employees have a valid claim on the information resources of the corporation, will request financial information from employers and will benefit from the receipt of such information. However, the rights of employees to information, their information demand and information needs, have not been integrated in any framework capable of empirical verification.

Rather than repeating fragmented arguments and opinions, researchers should now attempt to assemble testable empirical evidence relating to the questions:

- (i) How valid is 'the theory' of financial reporting to employees as identified by Hussey and Craig (1982, pp. 8–9)?
- (ii) What evidence exists to support the claims of benefits to the entity, management *and* employees? and
- (iii) What are the specific information needs of employees?

'Employees demand for information'—towards a research framework

In Australia and the USA, corporate annual reports are expected to furnish financial information to decision-makers, whilst it is suggested in the UK that information be provided to those with 'reasonable rights'.⁶ In both cases the target audience encompasses readers with potentially diverse interests and a wide range of financial expertise. As such, a rational identification of what to report and the degree of sophistication required of reports is exceedingly difficult. The continuing debate in

accounting literature concerning the identity of user groups to whom reports should be directed, evidences this difficulty.

In contrast, an organisation reporting directly to its employees is by definition dealing with an identifiable audience. While the interests, characteristics, and financial expertise of this audience may not be homogeneous, they should be capable of more precise specification than those of the audience for the annual report to shareholders. This suggests that the employee-required information in financial reports to employees, unlike those of annual reports to shareholders, should also be capable of more precise specification. The form and content of reports to employees will themselves be dependent upon the identification of the financial data necessary to satisfy 'employee demands'. Various parties have made suggestions regarding what information reports to employees should contain and, in an *ad hoc* and unstructured manner, have canvassed employee opinions of:

1. What information they require.
2. Their reaction to the report presented to them.

Appendix 2 provides a summary of researcher, management and employee suggestions. Until the identity and specifications of employee information demands have been established, a useful framework for evaluation of the 'employee demand' element of 'the theory' cannot be developed, and an integrated and coherent approach to research in the area cannot exist. Implicit in much of the literature is the assumption that employees demand information for decision-making purposes. Appendix 3 is a reconstruction of the contents of Appendix 2, consistent with potential decision-making objectives of an employee. While not denying or limiting the 'supply-side' research questions referred to earlier in the paper, the research design adopted here addresses questions related to employee demands for information.

A research design

As noted above, employee demand for information will be adopted as the basis around which the research design will be structured. A narrative flow chart within which specific questions prompted by such an orientation could be classified in some logical sequence must then be constructed. Additional propositions or alternative tests generated by variations in response to each question are anticipated and similarly incorporated in this flow chart. These questions and tests are presented in generalised form as Figure 1.

Having established the major elements of the research framework it is then possible to formulate testable propositions. A flow chart arranging these propositions in logical sequence appears as Figure 2. This presentation should facilitate the identifi-

⁶W. J. Kenley and G. J. Staubus, 'Objectives and Concepts of Financial Statements', *Accounting Research Study No. 3*, Accounting Research Foundation, Melbourne, 1972. American Institute of Certified Public Accountants, 'Objectives of Financial Statements', *Report of the Study Group of the Objectives of Financial Statements*, New York, 1973. Accounting Standards Steering Committee, *The Corporate Report*, London, 1975.

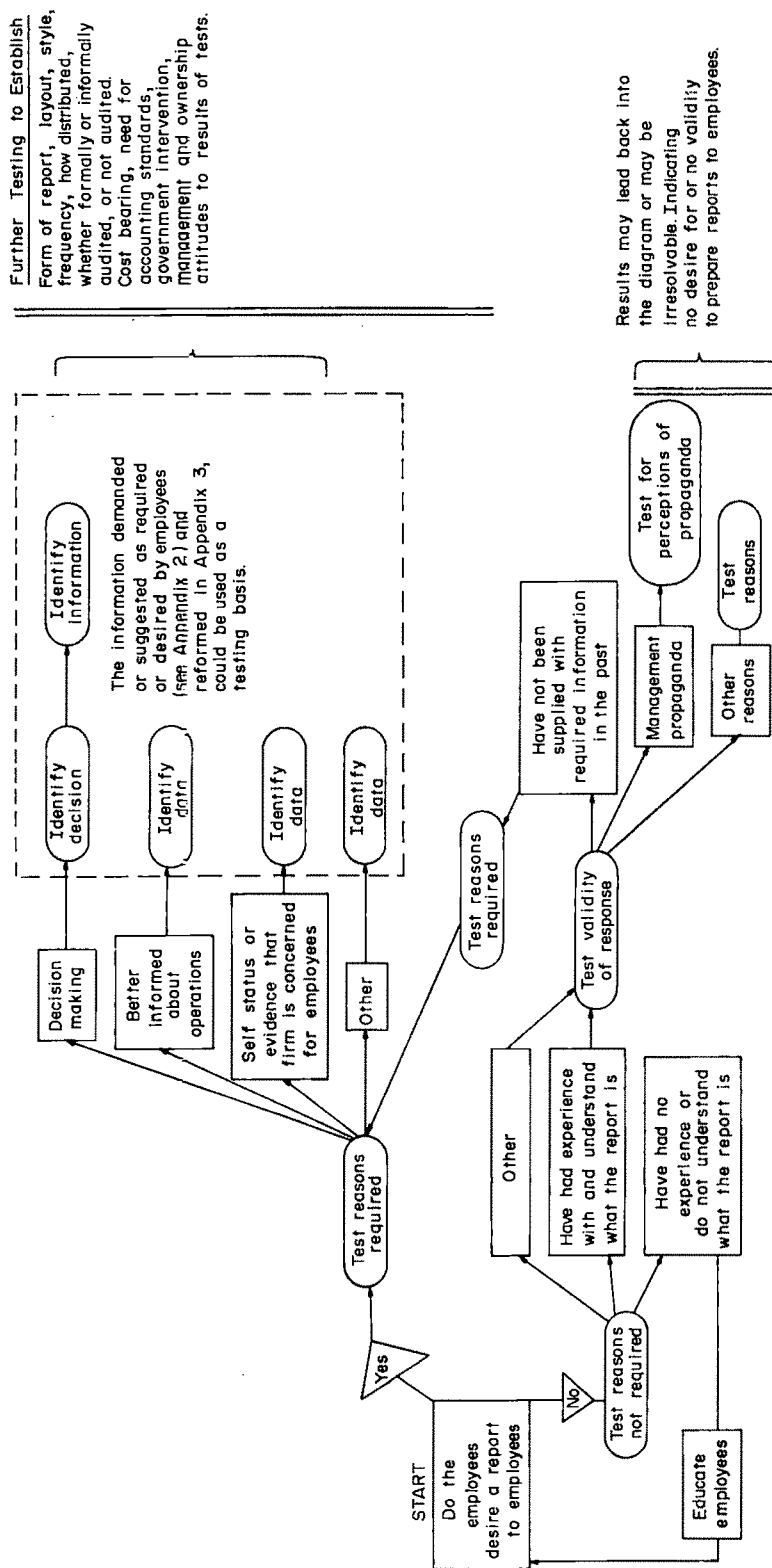


Figure 1.
A Narrative Flowchart of Required Empirical
Tests.

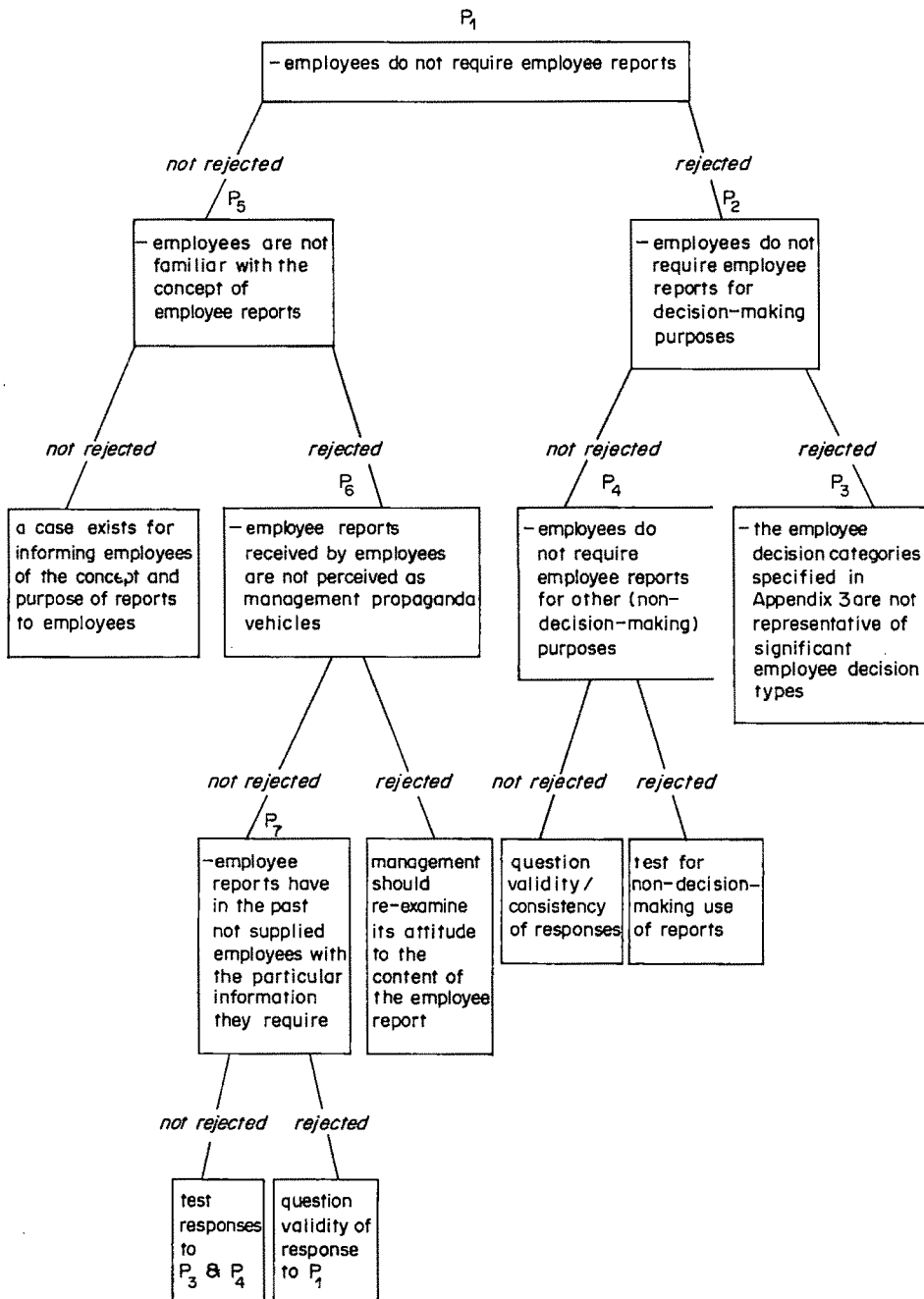


Figure 2.
A Flowchart of Propositions.

cation of any shortcomings in the dimensions of the research design and, thus, can lead to improvement, modification and/or elaboration in the future.

Considerations of the type of data to include in reports to employees, experiments directed at an improvement in the style of that presentation and of the potential benefits of such reports, presupposes that employees require them. There is however no evidence to support such a supposition. The first question to be posed is then obvious: *Do employees require such reports?* A positive response to this question generates follow up questions in an attempt to determine why they want the report and consequent information requirements. A negative response would seem to indicate that any further questions about the nature and content of reports to employees would be non-productive. Questions directed at determining the reasons for such a negative response are intended to serve as a built-in check on the consistency and validity of responses. Neither flow chart is intended to be an exhaustive specification of tests to be applied. What is presented is a basic framework of propositions, supplemented by general suggestions regarding further tests which may become necessary in some areas.

The propositions that are specified and briefly explained below should, therefore, be considered in conjunction with their encompassing framework outlined in Figures 1 and 2. They have been expressed in the negative to enable the flow chart (Figure 2) to retain some usefulness as research in the area progresses, with the development and testing of detailed null hypotheses.

Critical propositions

The following generalised propositions are proposed as a foundation for the later development of empirically testable hypotheses. These propositions are presented in general form only. Testable hypotheses which may flow from them would require precise specification of variables such as employee characteristics, report type, industry category, company size, etc.

Proposition 1 (P1)

Employees do not require 'employee reports'. As has been foreshadowed, this first proposition addresses the most basic and as yet unanswered question in the field of corporate financial reporting to employees. Do employees want to receive such a report? The question can be posed to employees regardless of whether they currently receive such a report or not. The results can then be classified to establish the response of any employee category. If, given an adequate sample size, P1 is rejected, questions of why such a report might be required can be posed.

Proposition 2 (P2)

Employees do not require 'employee reports' for any decision-making purposes.

Employees might demand reports for a number of reasons which are outlined in Figure 1. This proposition tests whether information for decision-making is the predominant reason for employee demand for reports. If P2 is rejected, then the information framed in Figure 1 could be used as a basis for further testing in order to ascertain appropriate report contents. This further testing requirement is embodied in proposition 3 that follows.

Proposition 3 (P3)

The employee decision categories specified in Appendix 3 are not representative of significant employee decision types.

Appendix 3 proposes several major categories of decisions that the authors believe are likely to confront employees from time to time. It has been suggested that these decisions will be the most significant reasons for which employees may require 'employee reports'. Since the determination of relevant report content will rely upon the identification of significant decision types, P3 must be rejected before Appendix 3 can be used as a basis for specifying information contents of employee reports.

Proposition 4 (P4)

Employees do not require information for 'other' (non-decision-making) purposes

This proposition can be used to test for non-decision-making information requirements and for consistency of responses. If P4 is not rejected when P2 has not been rejected and P1 has been rejected, then the validity of responses must be questioned because they are inconsistent. If P4 is rejected, further investigation of what these 'other' purposes may be must then be undertaken.

Proposition 5 (P5)

Employees are not familiar with the concept of employee reports.

Returning to P1, if it is not rejected, then it would be of interest to ascertain why employees did not desire 'employee reports'. P5 has been proposed in order to test the significance of an elementary reason for employee disinterest. If P5 is similarly not rejected then some education of employees as to what an 'employee report' is, may be considered useful and further retesting of their responses with a view to reassessing P1 might be considered later. If, however, P5 is rejected, then other reasons for employee disinterest in such reports may predominate. This leads to the formulation of proposition 6.

Proposition 6 (P6)

'Employee reports' received by employees are not perceived as management propaganda vehicles.

If P5 has been rejected, then it is possible that a major reason for employees showing disinterest in 'employee reports' may be their perception that it is a vehicle for management propaganda. This possibility has been expressed in P6. Should P6 be rejected, then further testing of the way in which report content, presentation etc. is perceived to be propagandist, and an assessment of benefits forgone by the company, will be useful.⁷ If, on the other hand, P6 is not rejected reasons for employee lack of interest must be considered, or some other reason may have to be searched for. This leads to the formulation of proposition 7.

Proposition 7 (P7)

'Employee reports' have in the past not supplied employees with the particular types of information which they require.

Should P6 not be rejected, then P7 is required to assess another possible major reason for employee lack of interest in 'employee reports'. If P7 is not rejected then retests of P3 and P4 are required as a prerequisite to discovering just what types of information employees *do* require (as distinct from what they have received in the past). The rejection of P7 would imply that an erroneous response was received for P1.

In conclusion

This paper has advanced seven propositions as the research foundation for the later derivation of testable hypotheses with respect to employee preferences for corporate employee reports. A logical progression for the determination of employee information requirements for decision-making has been constructed. It is argued that when the propositions contained in this research design have been thoroughly explored, a valid framework for the 'employee report' can be built. Previous analytical and empirical studies have attempted to specify such content and presentation in an unstructured fashion. This paper has attempted to provide a general framework consistent with a 'demand-based' perspective of corporate financial reports to employees.

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⁷Such testing could include investigation of the sections or passages in an employee report that are perceived as being propagandist and of the categories of employees (eg. Male/Female, Staff/Line, Manager/Subordinate, Blue Collar/White Collar) who exhibit these perceptions.

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7. Myers, 1979. A judge from the panel of judges for 'Enterprise Australia' awards for best company reports to employees, giving his impressions of some entries and judging panel reactions.
8. Parker, 1977a. A review of the incidence of reporting to employees in the 100 largest Australian companies, and a discussion of variations in presentation and content.
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12. Taylor, Webb and McGinley, 1979a. Further discussion of reasons for reporting and descriptions of existing reporting practices.
13. Taylor, Webb and McGinley, 1979b. A reproduction of the article published by these authors in *The Chartered Accountant in Australia*, May 1979, referenced above.
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APPENDIX 1

A sample of literature: 1970-1980

1. Goodland, 1978. Argues for communication to employees in a positive manner rather than disclosure on a 'take it or leave it' basis.
2. Hilton, 1978. A 'how-to-do-it' book.
3. Hussey, 1978. Interviews to ascertain 74 employees' report readership preferences and discussion of employee, researcher, management views on appropriate report contents.
4. Hussey and Craig, 1979. A reproduction of sections of Hussey, R., *Employees and the Employee Report*.
5. Hussey and Craig, 1980. A discussion of a survey of companies not reporting to their employees, examining possible reasons.

APPENDIX 2

Employee need for information as evidenced by demands or suggested needs

Presented below are types of information which have been: (a) suggested by an author as potentially useful to employees, or (b) observed as employee demands by an author. Information types are grouped according to the publication in which they were discussed:

Information on productivity and efficiency data at plant level; manpower plans; benefits; intra group payments; transfer prices; company's future plans. (Lafferty, 1977)

Pricing policy, especially transfer prices; advice re imminent collapse; social auditing (Swedish style). (Jenkins, 1975)

Future employment levels and work conditions; plans for expansion or contraction; effects of tech-

nological changes; training schemes; health and safety practices; pay conditions; terms of employment of various groups including managers; contribution made by employees in different plants and divisions; is adequate provision being made for pension payments?; can company afford higher wages?; can company succeed against competition?; is the company's overall product/cost/price structure right?. (Thompson, 1975)

Costings; performance indicators; manpower statistics. (Miller, 1975)

Details of past, present and planned capital spending; unit costs of inputs (operating costs and overheads); details of sources and uses of funds; changes in value of fixed assets and trade investments; details of individuals earnings and hours. (GMWU, 1976)

Performance detail of their own particular unit—be it factory, department or company. (Holmes, 1977)

Matters directly affecting their own work and conditions on the shop floor; information about future developments. (ICAEW, 1976)

Performance, pay prospects. (ICMA, 1978)

Reporting on health and safety of the workplace; reporting on the effect of productivity bargaining and the monitoring of profit sharing schemes; reporting on planning, agreements made between entity and government and the effect of these on job security; reporting on current and alternative distributions of income and the effect these have on the efficient allocation of resources; reporting for the purpose of negotiating a wage settlement. (Climo, 1976)

State of the order book; sales campaigns; exports; contracts entered; proposed capital expenditure and the reasons for it; fixed assets; the state of the cash flow; employment figures; changes in working practices and manpower requirements; productivity and proposed acquisition and disposals of segments of the company together with details of reasons for decisions taken; production, selling and distribution costs; costs of machinery; costs of management; costs of materials; health and safety costs and benefits; customer complaints; information re conduct of industrial relations; information on future plans. (Jones, 1975)

Production and marketing plans; difficulties likely to be met; research and development activity; future capital investment plans in terms of profit and equity; new facilities and the influence of these on employment and deployment of labour; information on success against previous objectives and identification of reasons for failure; changes in operating costs; details of cash flow situations; analysis of profit/loss generation; profit compared with sales and its disposition; capital employed performance; stock policy; plant utilisation; overtime; absenteeism, sickness etc. (Gogarty, 1975)

Monetary rewards; promotion opportunities; sta-

bility of employment; justice in distribution of rewards; identification with company's image. (Taylor, *et al.*, 1979a)

Individual plant spending accounts, particularly relating to levels of profitability; details of costing process; the types of costing system used and their impact on cost structure; how these affect returns at the level of the given plant; budgets and variances produced; the transfer pricing systems; stock levels; state of the order book. (Cuthbert and Whitaker, 1977)

Local factory and departmental accounts, cost structures, forecasts and budgets. (ICAEW and IPM 1978)

Company's safety record; investment plans; product performance; employee benefits; pension rights; progress with factory plans; outlook for future. (Martin, 1977)

APPENDIX 3

Table of possible employee decisions and information useful to those decisions (generated from Appendix 2)

<i>Employee Decisions</i>	<i>Information Useful</i>
Acceptance or rejection of entity offer of retraining/relocation/promotion/new position	Profile of entity employees: age, sex, volume changes, location, hierarchical/job type levels. Degree of employee welfare provisions. Management policy/attitudes. Technology changes. Capital or labour intensive comparisons. New business developments. Expansion or contraction plans.
Level of productivity	Wage levels, perquisites, advancement possibilities, attitude of remote/close management, budgetary proposals, imminent technological changes, safety of new machinery, working methods, accident and compensation record of entity, noise and toxicity levels, employee contribution to output, levels of workers in associated plants, product demand, stock level, cost structure of area/section/plant/division.

Job satisfaction. Stay or leave. Retirement planning.	Pension availability, contribution levels, and performance. Merger or takeover likelihood. Profitability, sales volumes, production volumes, cash flows, liquidity, labour and capital ratios, job opportunities in entity. Future manpower plans and technological changes. New products or ventures planned.	level of involvement if member.	ity/attitudes. Open or closed shop. Corporate social responsibility attitudes. Attitudes of management re profit-seeking versus cost-cutting. Expansion, contraction, relocation, new technologies, retraining plans. Employee welfare provisions — canteens, health and safety, bonus schemes. Employment terms and wages levels. Profitability, liquidity.
Personal investment. Saving levels, insurance (non-entity superannuation), employee shares, debentures in entity.	Likely or occurring takeovers or mergers. Profitability, liquidity, sales projections, new products, or ventures, expansion or contraction plans. Employee pension fund availability and performance.	Personal expenditure: General Organisation's products New products	Product knowledge of entity and its associated companies. New products. Employee purchase schemes. Product safety, performance and environment effects. Mergers and takeover developments. Wage levels. Liquidity. Gearing. Sales volumes. Profitability.
Union membership or non-membership;	Industrial relations statistics. Management pol-		

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A Strategy for More Efficient Audit Sample Determination*

S. Paul Roy

Introduction

US Statement of Auditing Standards SAS 39 tells us that audit planning involves the development by the auditor of a strategy for conducting an audit of financial statements. In most situations a part of that strategy will require planning of a particular sample for a substantive test of detail. A consideration important to this latter step will be the preliminary estimation of materiality levels.¹

There is a paragraph in SAS 39 that provides both the motivation and rationale for much of the work done in this paper. Because of its relevance here it is quoted below in its entirety. The paragraph states that:

Evaluation in monetary terms of the results of a sample for a substantive test of details contributes directly to the auditor's purpose, since such an evaluation can be related to his judgment of the monetary amount of errors that would be material. When planning a sample for a substantive test of details, the auditor should consider how much monetary error in the related account balance or class of transactions may exist without causing the financial statements to be materially misstated. This maximum monetary error for the balance or class is called tolerable error for the sample. *Tolerable error is a planning concept and is related to the auditor's preliminary estimates of materiality levels in such a way that tolerable error, combined for the entire audit plan, does not exceed those estimates.*²

An interpretation of this SAS that is current and seemingly reasonable is that the auditor must make preliminary estimates of materiality for the financial statements as a whole *and* that this overall estimate should be allocated to the individual account balances or classes.³ That is, a tolerable

error estimated for each account balance or class of accounts should be made. Furthermore, it then follows that the sum of tolerable error estimates over all account balances or classes must not exceed the estimate of materiality made for the financial statements as a whole. It would seem then that these allocations may have a bearing on audit efficiency in that they have an effect on audit sample size and consequently on audit costs.

This paper presents a strategy for minimising audit sample size in the above setting. Assume that overall financial statement materiality (M) has been estimated and allocated over all sub-categories, j , such that⁴

$$\sqrt{\sum_{j=1}^n M_j^2} = M \quad (\text{Equation 1})$$

where,

M_j = materiality in dollars for sub-category or account balance or class j (hereafter referred to as category)

This paper argues, and demonstrates, that, given the above assumption, the auditor can use the results from the audit of category j to justify a smaller sample size in category $j + 1$. The paper also develops a method of ordering the j 's such that overall audit performance costs are minimised.

This strategy allows for systematic revision of factors affecting sample size. It also provides some defence against the auditor's conservative and costly tendency to over-audit. Also, because of the ordering feature, the audit is amenable to more specific and precise planning—leading to further cost savings.

The next section of this paper discusses the general audit sample size problem in a statistical setting. This basic setting is extended in the third section to explore the sample size problem in a multi-category setting. Section 4 presents a numerical example of the developments in section 3. Section 5 presents a summary and discusses some implications of this paper as a whole. Appendices showing a stratified sampling strategy and a deri-

*The author would like to thank Andrew D. Bailey Jr. of The University of Minnesota, and an anonymous reviewer of this journal for valuable suggestions and criticisms.

¹SAS 39, paragraph 16.

²SAS 39, paragraph 18 (emphasis added).

³Warren, Yates and Zuber, p. 63.

⁴See Elliott and Rogers, p. 53, or Zuber, Elliott, Kinney and Leisenring, p. 53, fn. 6.

vation of the basic sample size determination formula (equation 2) are also included.

The problem

One set of decisions that auditors typically have to make is the decision as to sample size in a testing situation. Audit costs are sensitive to sample size in that costs of performing audit steps presumably increase as sample size increases. For a given level of statistical assurance and at a prescribed level of account balance sensitivity, the sample size may be the major variable that the auditor can vary in order to control audit performance costs. That is, the auditor wants to minimise sample size subject to constraints imposed by his requirement to fulfil the audit objective.

The audit objective is assumed to be that of deciding, by the auditor, whether or not the client's financial statements are free from material error. If the decision is that the statements are free from material error the auditor will accept (give a positive opinion) on them. If not, the statements are rejected by the auditor.

In a substantive testing of details, the auditor selects certain items, transactions or accounts for examination. The items selected (i.e. the sample) are evaluated and a decision about the population (i.e. category) from which the sample was drawn is formed.

Thus in category j , the auditor wishes to draw n_j items for examination from the N_j items contained in category j ($n_j \leq N_j$).

Let μ_j represent the mean of the true values of the elements in the j^{th} category (an unknown value). Further let $\bar{X}_j$ denote the mean value reported by the client (the control account balance divided by N_j , say). M_j is the tolerable total error in the j^{th} category while $Pr_j = M_j/N_j$ is the tolerable

error per unit (i.e. precision). We will assume that N_j is known and large and that an estimate of M_j is available.⁵

Consider the audit setting as represented by Figure 1. This figure represents the distribution of x_j , the audited value of items in the j^{th} category. The subscript will be dropped for the time being, but it should be understood that the following discussion concerns the distribution of x in a specific category.

Consider also the following definitions:

$H_0: \mu = \bar{X}_r$ The mean value of the audited accounts equals the mean of the reported account values.

The distribution labelled H_0 is the distribution of x assuming H_0 holds. That is, the account balances as reported should be accepted.

$H_1: \mu \neq \bar{X}_r$ The mean value of the audited accounts does not equal the mean of the reported account values.

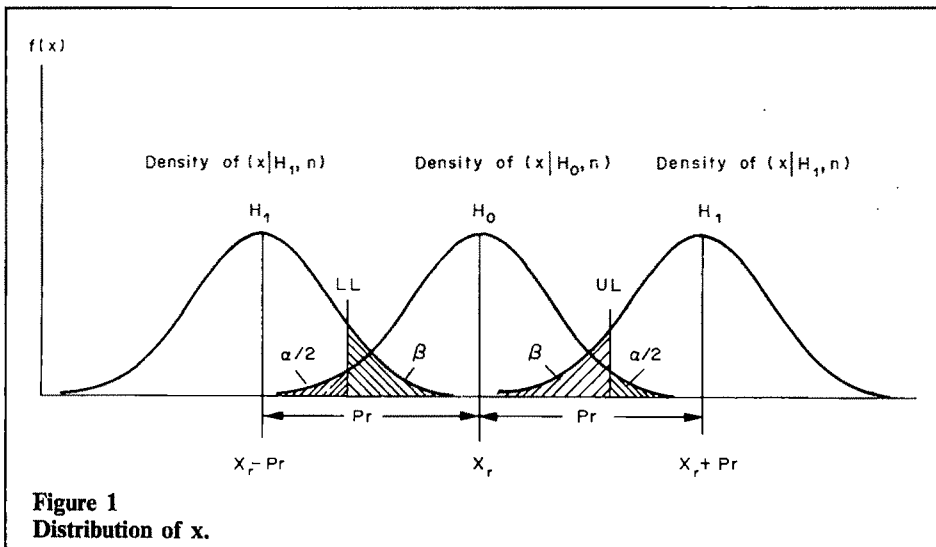
In this state we would like to reject management's representations. In this state, the distribution of x is as shown in Figure 1 and labeled H_1 .

It is assumed that the standard deviation (σ_x) is the same under either state, and that σ_x can be accurately estimated. We shall also assume that n is large enough to invoke the central limit theorem (i.e. we assume $\bar{x} \sim N(\mu, \sigma_x^2/n)$, where $\bar{x}$ is the sample mean of audited values).

We can now make probability statements about $\bar{x}$, thus:

$$P(\bar{x} \geq UL | H_0) + P(\bar{x} \leq LL | H_0) = \alpha$$

⁵This audit setting is as described in Kinney, p. 118. The allocation procedure is also discussed in Zuber, Elliott *et al.*



where UL and LL are upper and lower statistical limits respectively such that the probability statement holds. Thus the auditor would reject H_0 if $\bar{x} \geq UL$ or $\bar{x} \leq LL$. For the sample values of UL and LL , the same rejection strategy would also be consistent with the probability statement that:

$$P(\bar{x} < UL | \mu = Xr + Pr) = \beta$$

or

$$P(\bar{x} > LL | \mu = Xr - Pr) = \beta$$

The common strategy, then, is to select UL and LL such that α and β are at their pre-set levels given the value for Pr and the distributional assumption on $\bar{x}$. In this case:

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \sigma_x^2}{Pr^2} \quad (\text{Equation 2})$$

Equation 2 is used to determine a sample size n such that accept or reject decisions can be made about $\bar{X}r$ given $\bar{x}$ with the risks of α and β errors at the pre-set levels. It should be noted that σ_x is not known nor is S_x (the sample standard deviation that can be determined only after the audit). An estimate of σ_x , designated $\hat{\sigma}_x$, must therefore be substituted into Equation 2 to determine n . Thus equation 2 becomes:

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \hat{\sigma}_x^2}{Pr^2} \quad (\text{Equation 3})$$

After the audit is performed using a sample of n , $\bar{x}$ and S_x are determined. An ex-post confidence interval is then constructed:

$$\bar{x} - Z_{1-\alpha/2} S_x / \sqrt{n} \leq \mu \leq \bar{x} + Z_{1-\alpha/2} S_x / \sqrt{n}$$

If $S_x = \hat{\sigma}_x$ the achieved confidence interval is the same as the planned confidence interval, and consequently β risk actually achieved is the same as planned β risk. If $S_x > \hat{\sigma}_x$ then β risk is greater than planned. Thus the auditor must consider this in his evaluation of the results obtained (i.e. further testing may be required).

It can be argued that a conscious strategy of choosing small $\hat{\sigma}_x$'s might be adopted by an auditor anxious to cut audit performance costs. This is certainly a possibility but not one that should seriously limit the applicability of the technique. One factor operating against the likelihood of such a strategy is the relatively large size of fixed versus variable audit performance costs. The occurrence of a signal of $S_x > \hat{\sigma}_x$ calls for further testing. This means a second at least partial start-up in the area. It will likely lead to over audit in the area as well. There will, I think, be an incentive to estimate σ_x conservatively.

If $S_x < \hat{\sigma}_x$ then the achieved β risk is less than planned. Alternatively, 'the equality of planned and attained precision at this level of α risk de-

pends on the value of S_x compared to the value of $\hat{\sigma}_x$ used to compute sample size.'⁶

Consider Figure 2. In case A we have the initial conditions. Cases B and C show two different adjustments that can be assumed when $S_x < \hat{\sigma}_x$. In Case B, precision can be maintained at $P_{rb} = P_{ra}$, while the attained α and β risks can be assumed to have decreased. If α_b is maintained at α_a then $\beta_b < \beta_a$. The figure reflects the smaller variance in case B. If precision and α are maintained then β can be seen to be smaller.

Figure 2 case C assumes that α_c and β_c are maintained at the planned levels of α_a and β_a . Achieved precision is thus less than planned precision.

This paper explores the possibility of more efficient sample selection in cases where $S_x < \hat{\sigma}_x$.⁷ An easily programmable method is suggested that incorporates the results from the audit of one category into the *planning* of this audit for the next category.

Sample size strategy in a multi-category setting

Consider an audit setting where two categories (say inventories and receivables) are to be audited consecutively. The following are either known or have been estimated:

1. $M^2 = \sum_{j=1}^2 M_j^2 = M_1^2 + M_2^2$ Materiality estimates
2. $Pr_j = M_j / N_j$ for each category j
= Tolerable error
3. $\hat{\sigma}_{xj}$ for each j .
4. α_j and β_j have been selected for each j .

Step 1

Then for category $j = 1$, by applying Equation 3:

$$n_1 = \frac{(Z_{1-\alpha_1/2} + Z_{1-\beta_1})^2 \hat{\sigma}_{x1}^2}{Pr_1^2} \quad (\text{Equation 3})$$

= sample size for category 1.

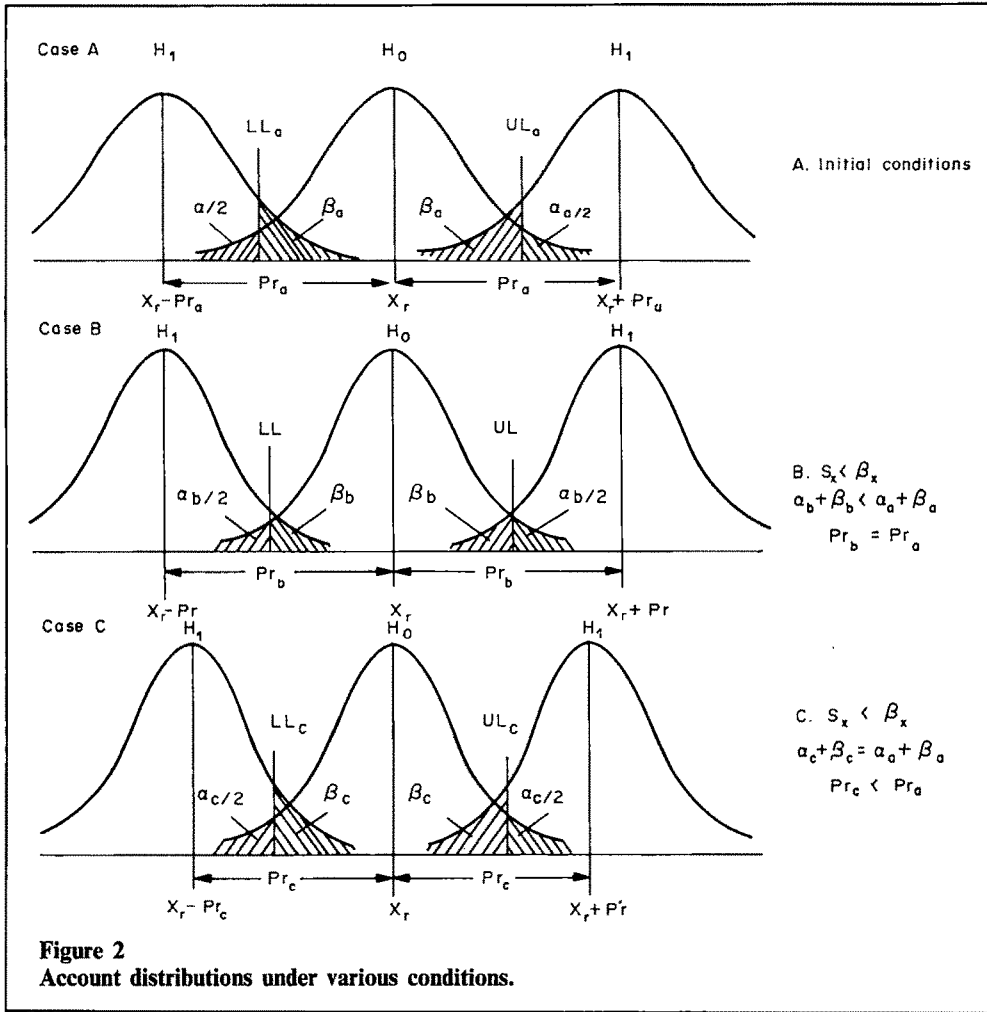
The sample of size n_1 is drawn and audited. Sample statistics are computed.

Step 2

If $S_{x1} > \hat{\sigma}_{x1}$ then achieved precision is less than planned precision and further consideration must be given to the decision to accept the client's representations.

⁶Bailey, fn. 8, p. 77.

⁷Sample efficiency is used here as in SAS 39 to mean that one sample is more efficient than another if it can achieve the same objectives with a smaller sample size.



If $S_{x_1} < \hat{\sigma}_{x_1}$ then compute

$$Pr'_1 = \frac{(Z_{1-\alpha_{1/2}} + Z_{1-\beta_1})S_{x_1}}{\sqrt{n_1}} \quad (\text{Equation 4})$$

= achieved precision in population 1 and $Pr'_1 < Pr_1$

Step 3

Step 1 can now be repeated for population 2:

$$n_2 = \frac{(Z_{1-\alpha_{2/2}} + Z_{1-\beta_2})^2 \hat{\sigma}_{x_2}^2}{Pr_2^2} \quad (\text{Equation 3a})$$

except that because

$$M_1^2 + M_2^2 = M^2$$

and

$$M_1 = (Pr_1)(N_1)$$

$$M_2 = (Pr_2)(N_2)$$

then:

$$(Pr_1 N_1)^2 + (Pr_2 N_2)^2 = M^2 \quad (\text{Equation 5})$$

$$(Pr_2)^2 = \frac{M^2 - (Pr_1 N_1)^2}{N_2^2}$$

Substitute Pr'_1 for Pr_1 in equation 5 and thus

$$Pr_2^{*2} = \frac{M^2 - (Pr'_1 N_1)^2}{N_2^2}$$

= revised planned precision for category 2

and because

$$Pr'_1 < Pr_1$$

then

$$Pr_2^* > Pr_2.$$

If we then substitute Pr_2^* for Pr_2 in Equation 3a then we have n_2^* , where $n_2^* < n_2$

Conclusion: If $S_{x_1} < \hat{\sigma}_{x_1}$

$$\text{Then } n_2^* < n_2$$

Thus under conditions where achieved precision is greater than planned the auditor can use that result to justify decreased work on the next group of accounts.

Audit sequence order

An *ex ante* estimate of σ_{x_j} designated $\hat{\sigma}_{x_j}$ is necessary for preliminary determination of n_j . P_{r_j} is also necessary. Then $\hat{\sigma}_{x_j}/P_{r_j} = k_j$ where

$$k_j = \frac{\sqrt{n_j}}{Z_{1-\alpha_j/2} + Z_{1-\beta_j}}$$

for any α_j and β_j chosen. Consider now an *ex post* estimate of σ_{x_j} designated S_{x_j} such that $S_{x_j} < \hat{\sigma}_{x_j}$. Then achieved precision designated

$$P'_{r_j} = \frac{S_{x_j}}{k_j} = \frac{S_{x_j}}{\hat{\sigma}_{x_j}} P_{r_j}$$

Thus the new or achieved precision is directly related to the closeness of $\hat{\sigma}_{x_j}$ to S_{x_j} . This also tells us that achieved precision is independent of n_j .

Still in the two category case then:

$$Pr'_1 = S_{x_1}/k_1$$

$$n_2^* = \frac{(Z_{1-\alpha_2/2} + Z_{1-\beta_2})^2 \hat{\sigma}_{x_2}^2}{(P_2^*)^2} = \frac{(Z_2)^2 \hat{\sigma}_{x_2}^2}{(P_2^*)^2}$$

where:

$$Z_2 = Z_{1-\alpha_2/2} + Z_{1-\beta_2}$$

let

$$k_2^* = \hat{\sigma}_{x_2}/Pr_2^*$$

then

$$n_2^* = Z_2^2 k_2^{*2}$$

and

$$n_1 + n_2^* = k_1^2 Z_1^2 + k_2^{*2} Z_2^2$$

In a similar manner we can develop an expression for $n_1^* + n_2$. That is, if category 2 is audited before category 1 and S_{x_2} is used to incorporate the achieved precision in category 2 (i.e. P'_{r_2}) into the revised determination of n_1 (i.e. n_1^*), then:

$$n_1^* + n_2 = k_1^{*2} Z_1^2 + k_2^2 Z_2^2$$

The auditor will prefer that strategy that minimises audit sample size across categories (assuming each element is equally costly to audit). Thus the auditor will follow the rule that if:

$$n_1 + n_2^* < n_1^* + n_2 \quad (\text{Result 1})$$

then audit category 1 before category 2.

And if

$$n_1 + n_2^* > n_1^* + n_2 \quad (\text{Result 2})$$

then audit category 2 before category 1.

Result 2 will hold if:

$$n_1^* + n_2 < n_1 + n_2^*$$

or

$$(k_1^*)^2 Z_1^2 + k_2^2 Z_2^2 < k_1^2 Z_1^2 + (k_2^*)^2 Z_2^2$$

but

$$k_j^* = k_j \hat{\sigma}_{x_j} / S_{x_j}$$

Thus

$$\left[\frac{k_1 \hat{\sigma}_{x_1}}{S_{x_1}} \right]^2 Z_1^2 + k_2^2 Z_2^2 < k_1^2 Z_1^2 + \left[\frac{k_2 \hat{\sigma}_{x_2}}{S_{x_2}} \right]^2 Z_2^2$$

$$\frac{k_1^2 Z_1^2}{k_2^2 Z_2^2} < \frac{\hat{\sigma}_{x_1}^2}{S_{x_1}^2} - 1 \left/ \frac{\hat{\sigma}_{x_2}^2}{S_{x_2}^2} - 1 \right. \quad (\text{Equation 6})$$

Thus in order to anticipate the preferred order an estimate of the *ex post* sample variance is required. But that is a circular requirement. Thus if we assume

$$\hat{\sigma}_{x_1}^2 / S_{x_1}^2 = \hat{\sigma}_{x_2}^2 / S_{x_2}^2 > 1$$

then the right hand side of Equation 6 is one and thus:

$$\frac{k_1^2}{k_2^2} < \frac{Z_2^2}{Z_1^2} \quad (\text{Equation 7})$$

$$k_1^2 Z_1^2 < k_2^2 Z_2^2$$

But recall that

$$k_1^2 Z_1^2 = n_1$$

$$k_2^2 Z_2^2 = n_2$$

Thus our optimal rule is to audit the population with the largest preliminary indicated sample size first.

Audit performance costs

Let c_j = cost of auditing one item in category j . Then $c_j n_j$ = audit performance costs in category j . This assumes that audit performance costs are either all variable, or that any fixed costs must be incurred regardless of the size of n_j . This assumption seems reasonable if we accept that some minimum level of substantive testing will probably be required for each category.

Result 2 above then becomes:

Audit category 2 before category 1 if:

$$c_1 n_1^* + c_2 n_2 < c_1 n_1 + c_2 n_2^*$$

Through a similar process we arrive at a decision rule similar to that shown in equation 7, namely: if

$$c_1 k_1^2 Z_1^2 < c_2 k_2^2 Z_2^2 = c_1 n_1 < c_2 n_2$$

then audit category 2 before category 1. Thus the largest preliminary estimate of total category audit costs will determine the category to be audited first.

Table 1
Data for Example⁸
(a) *Input data:*

	Category		Total
	1	2	
M_j	\$20,000	\$75,000	\$77,620
$\sigma_{x_j}^2$	\$28	\$75	
S_{x_j}	\$21.966	\$59.77	
N_j	2,000	5,000	7,000
α_j	0.05	0.05	
β_j	0.25	0.25	
c_j	\$3	\$2	

(b) *Derived results:*

P_{r_j}	10	15
k_j	2.8	5.0
$Z_j = Z_{1-\alpha/2} + Z_{1-\beta}$	2.635	2.635
$n_j = (k_j^2)(Z_j)^2$	55	174
Pr'_j	7.80	11.94

⁸Data taken from Bailey p. 124 and p. 145.

⁹Note that the conditions required in formulating equation 7 above are satisfied. Namely that:

$$\frac{\sigma_{x_1}^2}{S_{x_1}^2} = 1.62 \approx \frac{\sigma_{x_2}^2}{S_{x_2}^2} = 1.57 > 1$$

General multi-category case

The results above are fully extendable to the multi-category case. In the absence of cost information or when the cost coefficients are the same across categories, the category to be audited first is the one with the largest preliminary estimate of n . If there are cost coefficients that differ across categories the most costly category will be audited first.

Numerical example

If we consider the data in Table 1, the total indicated audit costs, *given* that the client's representations should be accepted, are:

$$\begin{aligned} c_1 n_1 + c_2 n_2 &= (3)(55) + 2(174) \\ &= \$513 \end{aligned}$$

where

$$\begin{aligned} n_1 &= \frac{Z_1^2 \sigma_{x_1}^2}{Pr_1^2} = \frac{(2.635)^2 (28)^2}{(10)^2} = 55 \\ n_2 &= \frac{Z_2^2 \sigma_{x_2}^2}{Pr_2^2} = \frac{(2.635)^2 (75)^2}{(15)^2} = 174 \end{aligned}$$

Optimal strategy

The \$513 is the *maximum* we will pay. Our strategy is to perform the audit on category 2 first because:

$$c_1 n_1 = 165 < c_2 n_2 = 348$$

Audit of category 2 yields $S_{x_2} = 59.77$.

$$\begin{aligned} Pr'_2 &= \frac{Z_2 S_{x_2}}{\sqrt{n_2}} \\ &= \frac{(2.635)(59.77)}{\sqrt{174}} = 11.94 \end{aligned}$$

$$\begin{aligned} Pr_1^{*2} &= \frac{M^2 - (Pr'_2 N_2)^2}{N_1^2} \\ &= \frac{(77,620)^2 - (11.94)^2 (5,000)^2}{(2,000)^2} = 615.1936 \end{aligned}$$

$$Pr_1^* = 24.8$$

$$\begin{aligned} n_1^* &= \frac{(Z_1)^2 \sigma_{x_1}^2}{(Pr_1^*)^2} \\ &= \frac{(2.635)^2 (28)^2}{(24.8)^2} \\ &= 9 \end{aligned}$$

Result

$$n_1^* + n_2 = 9 + 174 = 183$$

$$c_1 n_1^* + c_2 n_2 = 3(9) + 2(174) = \$375$$

The only other strategy open to us in this case is to audit category 1 before category 2. If that were done then the results would have been as follows:

$$n_1 = 55$$

$$Pr'_1 = \frac{Z_1 S_{x_1}}{\sqrt{n_1}} = \frac{(2.635)(21.966)}{\sqrt{55}} = 7.80$$

$$Pr_2^{*2} = \frac{M^2 - (Pr'_1 N_1)^2}{N_2^2}$$

$$= \frac{(77,620)^2 - (7.80)^2(2,000)^2}{(5,000)^2} = 231.26$$

$$Pr_2^* = 15.20$$

$$n_2^* = \frac{(Z_2)^2 \hat{\sigma}_{x_2}^2}{(Pr_2^*)^2} = \frac{(2.635)^2 (75)^2}{(15.20)^2} = 169$$

Result

$$n_1 + n_2^* = 55 + 169 = 224$$

$$c_1 n_1 + c_2 n_2^* = 3(55) + 2(169) = \$503$$

The results are as anticipated. The strategy of adjusting precision to incorporate achieved precision resulted in lower sample sizes in the next audit category. Also, the decision rule derived in the previous section resulted in our choosing the least costly of the three alternatives.

Summary and implications

In a restricted setting where distinct audit categories can be audited consecutively, where estimates of σ_x are available, and where total materiality is estimated and allocated over the categories, a simple method has been shown to minimise total variable audit performance costs.

This method was shown to have the following desirable features:

1. It is simple, generalisable and can be easily implemented.
2. It provides a systematic defence against risk adverse behaviour on the part of field auditors and the audit firm itself. That is, the conservative tendency may cause overestimation of n_j . This method helps to prevent that, as n_j will have an effect on Pr_j' and thus on n_{j+1}^* .

This method provides for the incorporation of audit evidence into the audit decision model in a dependable manner, and in a way that is likely to be psychologically appealing to risk averse auditors.

3. The implementation of this method will necessitate the systematic attempts by auditors to make assessments of tolerable error and to allocate among categories as is strongly suggested in SAS 39.
4. Any subset of categories such that the assumptions fit that subset can be treated in the above manner as well.

Appendix 1

A note on stratified sampling

The revision process is perhaps more easily seen and potentially even more useful in application when it is related to stratified sampling. Consider

the data presented in Table 1 in the text of this paper.

Now suppose that the two categories represent two strata in accounts receivable, say with a total control account balance of \$95,000. The strata boundaries and the assignment of accounts to strata have been such that the data in categories one and two represent stratum data for strata one and two respectively. For computational ease, however, we will control for α risk only. Control of β risks as well is a straightforward extension but cumbersome.

Then:¹⁰

$$n_j = \frac{N_j \hat{\sigma}_{x_j} \sum_{j=1}^h N_j \hat{\sigma}_{x_j}}{(M/Z_{1-\alpha/2})^2 + \sum N_j (\hat{\sigma}_{x_j})^2}$$

Thus

$$n_1 = \frac{2,000(28) [2,000(28) + 5,000(75)]}{(77,620/1.96)^2 + (2,000)(28)^2 + 5,000(75)^2} = 15$$

$$n_2 = 101$$

Consider now an audit of stratum one yielding an estimate of σ_x of 21.966 = S_{x_1} . Taking this result as a better estimate of σ_x than is $\hat{\sigma}_x$, we can use logic developed in the body of the paper to reduce n_2 and still maintain the overall level of assurance of $\alpha = 0.05$.

That is,

$$n_2^* = \frac{5,000(75)[2,000(21.966) + 5,000(75)]}{(77,620/1.96)^2 + 2,000(21.966)^2 + 5,000(75)^2} = 98$$

While the difference is small, it is a reduction nevertheless. Under conditions where audit performance costs are high and revision costs are low the cost savings may be substantial.

Appendix 2

Derivation of equation (2)

Consider Figure 1:

$$UL = Xr + Z_{1-\alpha/2} \hat{\sigma}_{\bar{x}} = Xr + Z_{1-\alpha/2} \frac{\hat{\sigma}_x}{\sqrt{n}}$$

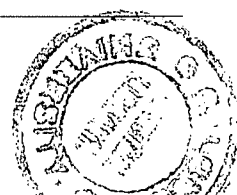
$$UL = Xr + Pr - Z_{1-\beta} \hat{\sigma}_{\bar{x}} = Xr + Pr - Z_{1-\beta} \frac{\hat{\sigma}_x}{\sqrt{n}}$$

$$Z_{1-\alpha/2} \frac{\hat{\sigma}_x}{\sqrt{n}} = Pr - Z_{1-\beta} \frac{\hat{\sigma}_x}{\sqrt{n}}$$

Thus:

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \hat{\sigma}_x^2}{Pr^2}$$

¹⁰See Bailey, p. 149.



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The Effects of Diagnostic and Redundant Information on Loan Officers' Predictions*

Ahmed Belkaoui

Introduction

A general consensus has emerged on the desirability of expanded disclosure of financial accounting information for all users [FASB, 1976; SEC, 1976 and Belkaoui and Kahl, 1978], and particularly for such expert users as financial analysts [Norr, 1976] and bankers [Wriston, 1974; Herrick, 1978]. The rationale for this consensus derives from the assumption that the provision of more data facilitates decision making [FASB, 1976]. The accounting literature has examined the possibility of information overload which may result from the expansion of disclosure [Driver and Mock, 1975; Barefield, 1972; Abdel-Khalik, 1973 and Casey, 1980b]. These studies have different definitions of information load and have produced conflicting findings [Casey, 1980b, p. 38]. Some of these variations may be explained, in part, by the failure to distinguish between the effect of diagnostic and redundant information. More precisely, expanded disclosure may lead to either a more diagnostic environment or a more redundant envi-

ronment. A diagnostic environment is characterised by the addition of data with incremental predictive ability. A redundant environment is characterised by the addition of data whose environmental predictive ability is already represented by other data. Briefly, the effect of information load may depend on whether the additional data are diagnostic or redundant.¹ Given the difficult task of defining what information load is [Miller, 1956; Phelps and Shanteau, 1978], one issue should be to investigate the impact of the addition of redundant information to diagnostic information on the quality of decisions based on this information.² Specifically, this study is designed to determine the impact of such an addition on the quality of loan officers' predictions of bankruptcy in terms of accuracy, calibration and decision time.

Thirty bank loan officers of a Chicago bank participated in a field experiment. The experimental task required the officers to predict which of ten real-life firms would declare bankruptcy and to state their confidence in their predictions, based on the availability of either strictly diagnostic information or a mix of redundant and diagnostic information.³

Issue: diagnostic and redundant information

Diagnosticity

The diagnosticity of accounting information is the degree of importance or relevance it has to the true state of the world. In the context of the prediction of an economic event, accounting information is diagnostic if it serves to predict the particular event. It is a characteristic or indication of the likelihood or presence of the event. Each of the major approaches to studying human information processing provides measures of data diagnosticity. In the regression variant of the lens model approach, the diagnosticity of an individual accounting datum is indicated by the correlation, r_{ie} , between the accounting datum, or cue X_i and the criterion event Y_e . This value, r_{ie} , is called the *ecological validity* of the i^{th} cue [Slovic and Lichtenstein, 1971]. In the analysis of variance

*This paper has benefited greatly from discussions with Robin Hogarth of the University of Chicago and Ed Joyce of the University of Minnesota and the suggestions and comments of Bob Libby of the University of Michigan, Cornelius J. Casey of Harvard University and the participants of the Accounting Research Workshop at the University of Illinois at Chicago.

¹Casey [1980a] also argues that predictive value is a joint function of the data's information content and the degree of redundancy in its presentation.

²While Miller [1956] suggested the magic number seven, plus or minus two, Phelps and Shanteau [1978] found their judges to be capable of using 9 to 11 pieces of information simultaneously.

³The rationale used by Casey [1980a, p. 37] for the choice of loan officers and bankruptcy prediction applies also to this study. Loan officers were chosen as ideal users of accounting information because they are found to rely on accounting data for decision making [Oliver, 1974; Libby, 1974; Kennedy, 1975; Herrick, 1978; Casey, 1980]. Similarly, predictions of bankruptcy were chosen as the criterion event because it is (1) an event of great interest to loan officers [Casey, 1980], and (2) a useful measure for the evaluation of accounting information [Casey, 1980; Beaver et al., 1968; AICPA, 1973; Libby, 1975; FASB, 1976].

approach, w^2 may be used as a measure of diagnosticity [Hays, 1973]. Finally, in the Bayesian approach, the likelihood ratio of accounting information may be used as a measure of data diagnosticity. In the absence of cue intercorrelation, these suggested measures may give equivalent indications of the relative diagnostic impact of each cue [AAA, 1977, p. 38].

Redundancy

Various definitions of redundancy exist in the behavioural and statistical literature. Placed in the context of referential communication, redundancy is the extent to which two cues do (or do not) imply the same referent dimension(s) or object(s) [Manis and Platt, 1975]. In the area of concept identification, two or more areas are regarded as redundant if they occur in the same set of stimulus objects [Trabasso and Bower, 1968]. Finally statistical redundancy implies data sources that are statistically intercorrelated to some degree [Gibbins, 1982]. These definitions are in fact complementary. *In brief, given a diagnostic cue, any additional cue implying the same referent dimension(s) or object(s), and also statistically correlated to it, is termed in this study a redundant cue.* This does not preclude a 'redundant cue' adding to the linear predictability of the relevant event.⁴

The impact of cue redundancy on the quality of the judgment requires more understanding and empirical investigation [Gibbins, 1982, p. 18]. In fact, the concept of redundancy was examined in various frameworks.

1. The increase in the number of cues resulting, for example, from expanded disclosure, may lead to a redundant environment. Two situations may be observed: (1) when an increase in the number of cues provided to the decision-maker does not lead to a redundant environment it may have an impact on the quality of the decision. For example, Hoffman and Blanchard [1961] found that an increase in the number of cues led to lower R values (linear consistency in the regression approach), decreased accuracy, lower test-retest reliability and lower response variance. Hayes [1964] found a decrease in decision quality occurring when subjects were working under a time constraint. (2) When the increase in the number of cues does lead to a redundant environment, an increase in the number of cues has a definite negative

impact on the quality of a decision. For example, Schmidt [1969] found that judgments based on less redundant sets were consistently more extreme than those based on more redundant information. Wyer [1968] also reported similar findings.

2. Redundancy may also be examined in the Brunswik framework [1943, 1952, 1956]. This framework for psychological analysis focuses on the organism's achievement in adjusting to a probabilistic environment through vicarious functioning. This last concept refers to the ability of the decision-maker to substitute for and make trade-offs between cues in a probabilistic environment. Given that this process of adaptation occurs within a particular environment which may be characterised by cues not only related to judgment and criteria but to each other, Einhorn et al. [1979] pointed out that the role of cue redundancy is important. More explicitly, this research identified a number of possible cognitive costs and benefits that may result from a redundant environment. The benefits when cues are redundant may include (a) limitation in information search without large losses in predictive accuracy, (b) highly selective attention, (c) reduction in the dimensionality of the information space, thereby preventing information overload, (d) facilitation of cue inter-substitutability, and (e) alleviation of cue unreliability by having multiple measures of the same cue variable. The costs of redundancy may include (a) difficulty in trading-off between cues when they are correlated, (b) waste of attentional effort on cues that are not *marginally* predictive, (c) the belief that too many cues can lead to overconfidence, and (d) the difficulty of learning from outcome feedback when cues are correlated [Einhorn et al., 1979].

3. Finally, various studies have examined the impact of redundancy on referential communication [Manis and Platt, 1975]. For example, Manis and Von Rooijen [1973] examined the relationship between referential redundancy and communication accuracy. Their results indicate that, other things being equal, the nonredundant message pairs produce a higher level of performance than the redundant pairs.

Hypotheses

Accuracy

H_1 : *Redundant accounting information added to diagnostic information will lead to a decrease in the accuracy of loan officers' predictions of accuracy.*

Two types of research evidence in psychology seem to support this hypothesis:

First: A decrease in communication accuracy resulting from the addition of redundant information sets is supported by the findings of Manis and Von Rooijen [1973].

Second: Redundant information, generated by an

⁴Gibbins [1982] showed that the predictive accuracy in the presence of cue redundancy depends on the statistical model used. More specifically, he hypothesised that cue redundancy resulting from the intercorrelation of sources 'is unambiguously detrimental to estimation or predictive accuracy only under certain specific correlation conditions in the linear regression model, but can be quite helpful to accuracy in the linear regression model otherwise; has a reduced and not regular effect on accuracy in the nonlinear regression model; and may be irrelevant to estimation of simple conditional probabilities' [p. 134].

increase in the number of cues, leads to a decrease in decision quality [Hoffman and Blanchard, 1961; Hayes, 1964; Einhorn, 1971; Schmidt, 1969; and Wyer, 1968].

Shroder et al. [1967] developed a model which may also provide support for the hypothesis. The model predicts that subjects will respond to additional information by increasing the complexity of their information processing from relatively low 'concrete' to high level 'abstract'. As more information is added, abstractness increases up to a point of maximum abstractness beyond which it is decreased as the environment grows more complex. In the context of this study, assuming maximum abstractness is reached with the use of diagnostic information, any additional redundant cue is associated with less complex, or more concrete, information processing. This may result in a decrease of accuracy because for complex tasks, such as the analysis of financial data, more abstract information processing is generally desirable [Casey, 1982]. More precisely, as shown in other studies [Libby, 1975; Casey, 1980; and Abdel-Khalik and El-Sheshai, 1980], the loan officers participating in the experiments were found to use a certain decision model based on diagnostic information; adding redundant information will change the search and evaluation of cues, place some weight on some of the redundant rather than the diagnostic cues as a result of differentiating among the cues, and change the judgment. The new and more concrete information processing will result in a decrease in accuracy.

Calibration

H₂: *Redundant accounting information added to diagnostic information will lead to overconfidence by the loan officers in their predictions of bankruptcy.*

A judge is considered well calibrated if, over the long run, for all propositions assigned a given probability, the proportion that it is true is equal to the probability assigned. In general, the calibration of individuals is evaluated by determining their probability assessments, verifying the related statements, and then determining the proportion that it is true for each case examined. Individuals who are not calibrated are said to be either underconfident or overconfident.⁵

Cue redundancy, by reducing the need to attend to and evaluate the number of cues available to the decision-maker, may increase the loan officer's confidence without increasing the quality of his or her decisions. Three types of evidence may be used to support the hypothesis. First, Oskamp [1965] found that, as the amount of information about a case increased, the confidence of subjects increased dramatically and entirely out of proportion to

actual correctness. Second, Einhorn et al. [1979, p. 467] state that the belief that one has made use of many cues in forming one's judgement coupled with the attentional effort spent on cues that are not marginally predictive can lead to overconfidence [Oskamp, 1965; Ryback, 1967]. Finally, it is maintained that in intuitive judgments, 'people tend to have great confidence in predictions based on redundant input variables' [Tversky and Kahneman, 1974, p. 1126].

Decision Time

H₃: *Redundant accounting information added to diagnostic information will lead to a longer decision time taken by the loan officers in their prediction of bankruptcy.*

Although one may assume intuitively that easy decisions require less time than more difficult decisions, the relationship between decision time and task complexity is more complex. In fact, when the cost of the decision is differentiated with respect to time, a nonmonotonic relationship is said to exist between this variable and task complexity [Pollay, 1970; Hogarth, 1975]. Of interest to this study, both Pollay and Hogarth postulate task complexity as an increasing function of the number of dimensions per alternative and the difficulty of choice between alternatives. Given that cue redundancy consists of an increase of dimensions per alternative, one may hypothesise that both task complexity and decision times increase non-monotonically with an increase in the number of redundant cues. Furthermore, Hogarth [1975] postulates that the decision maker minimises the costs of (1) time of the decision procedure and (2) errors made. The cost of time is postulated as an increasing function of decision time and the degree of cognitive strain created by the choice situation. The number of errors made is postulated as an increasing function of the number of alternatives, the number of dimensions per alternative and the difficulty of choice between alternatives, and a decreasing function of decision time. Cue redundancy involves an increase in the number of cues per alternative, making the choice between alternatives more difficult and increasing the cognitive strain created by the choice situation. As a result, both the costs of the decision procedure and errors made and the decision times themselves may increase as a result of cue redundancy.

Method

Task

Subjects were randomly assigned to one of two treatment groups. Loan officers in treatment group 1 received *diagnostic* information in the form of a consecutive three-year set of six financial ratios for each of 10 firms. These ratios included the following: net income/total assets, cash/total assets, cur-

⁵A survey of the growing literature on calibration has been provided by Lichtenstein, Fischhoff and Phillips [1977; 1980].

rent assets/total assets, current assets/current liabilities, net assets/current assets and total liabilities/owner's equity. The diagnosticity of these ratios, in terms of possessing statistical information content for predicting bankruptcy with greater than random accuracy, can be found in Beaver [1966], Libby [1975], and Casey [1980]. Loan officers in treatment group 2 received the same diagnostic information and in addition *redundant* information in the form of a consecutive three year set of three financial ratios for each of the ten firms. These ratios included the following: total liabilities/total assets, cash/current liabilities and current assets/sales. These ratios were considered redundant. First, they imply to a certain extent the same referent dimensions as some of the ratios containing diagnostic information. Second, the predictive ability of a classification model based on the nine diagnostic and redundant ratios did not improve on a similar model based only on the diagnostic ratios.⁶ Finally, significant correlations were found between the redundant and some of the diagnostic ratios for each of the three years.⁷

On the basis of these data, either strictly diagnostic or a combination of diagnostic and redundant data, loan officers were asked:

⁶A separate generalised square distance classification model [Tatsuoka, 1974] was constructed for the three years of data preceding the bankruptcy for 20 companies (10 bankrupt, 10 non-bankrupt). The 20 companies included the 10 companies to be used in the experiment. The model based on both the diagnostic and redundant ratios did not improve on the classification obtained by the model based only on the diagnostic ratios.

⁷Significant correlations were found for each of the three years preceding the bankruptcy between total liabilities/total assets and total liabilities/owner's equity, cash/current liabilities and cash/total assets, and current assets/sales and current assets/current liabilities. Similarly, R^2 decreased by 8.6% when the redundant ratios were added to the classification model based only on the diagnostic ratios.

⁸Similar to Casey [1980], the decision to limit the number of firms to 10 was motivated by the need to keep the interest of loan officers and avoid making the experiment tedious and repetitious.

(1) to predict for each firm whether it did or did not declare bankruptcy (i.e. file petition under Chapter X or XI of the Federal Bankruptcy Act) in the three year period following the last year for which accounting data were provided. For example, if the data received referred to the years 1969, 1970 and 1971, the loan officers predicted bankruptcy or nonbankruptcy for the period 1972 through 1974; (2) to decide how confident they are that they have, in fact, chosen the correct answer.

The loan officers were also asked to report the time spent in completing the task, provide background information and complete Budner's intolerance of ambiguity scale [Budner, 1962].

The ten firms included in this study are the same ones used in Casey's information overload study [1980]. These firms, shown in Table 1, include 5 bankrupt and 5 nonbankrupt firms. The bankrupt firms satisfy the following criteria: (1) they filed bankruptcy petitions under Chapter X or XI of the Federal Bankruptcy Act during the period 1972 through 1976, (2) they were listed under the 'bankruptcy' heading in the *Wall Street Journal Index* and (3) they had available at least five consecutive years of annual report data. Their identities were concealed by labeling each firm a 'one company', 'two company', etc. . . . Besides the accounting ratios, each firm's SIC classification and the year for which the data were provided were also disclosed.⁸

Subjects

One major Chicago bank agreed to participate in this field experiment. The experiment was run under the auspices of management at the subject's place of employment. Thirty loan officers participated in the experiment. Two liaison men from the bank were appropriately instructed and given the responsibility of distributing the questionnaire and conducting the experiment in each subject's office. The average age of the officers was 32 years with a minimum age of 25 and a maximum of 46. The participants held the job of officer for an average number of six years, with a minimum of one and a maximum of 21. Thirty officers held an

Table 1		
Sample Firms		
<i>Questionnaire Identity</i>	<i>Actual Identity</i>	<i>Financial Status</i>
One Company	Scottex Corporation	Bankrupt
Two Company	Resistoflex Corporation	Non-Bankrupt
Three Company	Sterling Precision Corporation	Non-Bankrupt
Four Company	The Gray Manufacturing Corporation	Bankrupt
Five Company	Permaneer Corporation	Bankrupt
Six Company	Cohu Electronics, Inc.	Non-Bankrupt
Seven Company	Old Town Corporation	Bankrupt
Eight Company	Kysor Industrial Corporation	Non-Bankrupt
Nine Company	General Steel Industries, Inc.	Non-Bankrupt
Ten Company	Maule Industries, Inc.	Bankrupt

undergraduate degree and six of them held a graduate degree. Finally, ten of the officers attended training school. To increase the interest in the task, performance feedback was made available to the officers at their request. Twenty of them requested it.

Results

Accuracy

The mean predictive accuracy scores were respectively 4.77 for the 'diagnostic' Group I and 5.33 for the 'redundant' Group II. Significant t and Mann Whitney U tests at the 0.05 level of significance result in the rejection of H_0 ($t = 2.161$ and $U = 57$). Contrary to previous results, these findings show that redundant information added to diagnostic information leads to an increase in the accuracy of loan officers' predictions of bankruptcy.⁹ Of interest to this study are Casey's [1980a] findings that officers with the heaviest information load had no greater predictive accuracy than officers with a lesser information load. The results of this study show that (1) an increase in the number of cues, even redundant cues, in addition to diagnostic cues may lead to an increase in the predictive accuracy of loan officers' judgments, and (2) the differences between Casey's findings and this study's findings may be due to the higher number of possible redundant cues used by Casey [1980].¹⁰ In short, information overload is related to and may be operationalised by an optimal number of cues. This assumption may be stated as follows: *as the redundant cues are added to diagnostic cues, predictive accuracy may increase up to a point where an increase of one or a certain number of redundant cues will lead to a decrease in predictive accuracy.* The significant improvement in performance of the group who received the higher information load may be due to several possible factors including (a) the possibility that the additional redundant information caused the subject to weigh cues in a more valid manner, (b) the possibility that the statistical model may have been misspecified, allowing human judges to use validly the incremental information that the statistical model could not. This raises the fundamental issue of determining, identifying and investigating the

circumstances in which the addition of redundant cues may improve decision performance. Extension of this type of research should examine the issue.

Calibration

Three direct measures of the validity of a set of probability assessments are possible: over- or underconfidence, calibration and resolution [Lichtenstein and Fischhoff, 1977, p. 161].

(1) Over/underconfidence may be measured as:

$$\frac{1}{N} \sum_{i=1}^T n_i (r_i - c_i)$$

where N is the total number of responses, n_i is the number of times the response r_i was used, c_i is the proportion correct for all items assigned probability r_i , and T is the total number of different response categories. r_i in this study is expressed by the loan officer's statement of the probability that his or her prediction of bankruptcy is correct. T is equal to 10 because the loan officers were asked to limit their probability responses to the single digits 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0. Overconfidence is expressed by a positive difference, underconfidence by a negative difference.

(2) Calibration may be measured as:

$$\frac{1}{N} \sum_{i=1}^T n_i (r_i - c_i)^2$$

A perfectly calibrated person would score 0 on this measure [Murphy, 1973].

(3) Resolution may be measured as:

$$\frac{1}{N} \sum_{i=1}^T n_i (c_i - C)^2$$

where C is the overall percentage correct. The higher the score the better [Murphy, 1973].

The term knowledge refers to another measure of probabilistic performance introduced by Murphy [1973, 1974]. It may be measured as:

$$C(1 - C)$$

Knowledge refers to the subject's ability to pick the correct alternative. Finally, Murphy [1973, 1974] showed that the calibration, resolution and knowledge form a partition of the Brier score [1950], an overall measure of adequacy of performance in a probabilistic task, such as the smaller the score the better. The Brier score is as follows:

Brier = Knowledge + Calibration - Resolution

$$C(1 - C) + \frac{1}{N} \sum_{i=1}^T n_i (r_i - c_i)^2 - \frac{1}{N} \sum_{i=1}^T n_i (c_i - C)^2$$

Summary statistics of the scores for over/underconfidence, calibration, resolution, knowledge and Brier are contained in Table 2.

⁹It is interesting to report that Libby [1975] found that bank loan officers asked for one of the redundant ratios used in this study, total liabilities divided by total assets, some of them indicating that they can make better decisions with that ratio included. This study shows that the addition of such a ratio leads to an increase in the loan officers' judgment accuracy which may explain Libby's findings.

¹⁰Casey's [1980a] subjects in Group I received information similar to that used for this study. However, his subjects in Group II received in addition income statements and balance sheets without notes, and his subjects in Group III were given the notes to the financial statements in addition to the same data received by Group II.

Table 2
Measures of Probability Responses for the Two Groups of Subjects*

Group	Over/ underconfidence	Calibration	Knowledge	Resolution	Brier
Diagnostic	0.0647	0.1008	0.2270	0.0416	0.2900
Redundant	0.1495	0.1046	0.2160	0.0600	0.2560
t test**	2.181***	2.14***	0.2683	2.06***	2.07***
U test	57***	58***	80	58***	58***

*All hypotheses were tested against one-sided alternative.

**The t formula for small samples was used.

***Significant at the 0.05 level.

The probabilistic responses of both groups, diagnostic and redundant, indicate a general overconfidence of subjects. This adds to the consistency of the findings that, in a variety of tasks, judges tend to be overconfident.¹¹ Of interest to this study is the significant difference in overconfidence between the two groups. More explicitly, loan officers presented with both diagnostic and redundant information showed greater overconfidence in their predictions as suggested by H_2 .

A significant difference was also found in the calibration of both groups. As can be seen in Table 2, subjects presented with both diagnostic and redundant cues showed lower calibration. Thus, although loan officers in this experiment were moderately well calibrated, a decrease is noticeable with those subjects presented with both redundant and diagnostic information.

No significant difference was found in the knowledge measures of both groups. The subjects' ability to pick the correct alternative was not affected by the different information provided to both groups.

However, a significant difference was found in the resolution measures of both groups. As shown in Table 2, subjects presented with both diagnostic and redundant information showed better resolution. In other words, they displayed better ability to discriminate among different degrees of subjective uncertainty.

Finally, a significant difference in the Brier scores of both groups was found. As shown in Table 2 loan officers provided with both diagnostic and redundant information had better Brier scores.

In short, the addition of redundant information to diagnostic information led to greater overconfidence, resolution and an overall better performance in the probabilistic task presented to loan officers in this experiment. They showed, however, lower calibration.

Decision Time

The mean decision times for Group I (diagnostic) and Group II (redundant) were respectively

4.55 and 5.33. Significant t and Mann-Whitney U tests result in an acceptance of H_3 at the 0.05 level. In short, redundant information added to diagnostic information led, in this experiment, to longer decision times by the loan officers in their predictions of bankruptcy. Following the analyses of Hogarth [1975] and Pollay [1970], this study shows that cue redundancy, by involving an increase in the number of cues per alternative, may make the choice between alternatives more difficult and thereby increase the cognitive strain created by the choice situation and the decision time taken. However, unlike the conclusions drawn by Hogarth and Pollay, the redundancy in this experiment did not lead to an increase in the errors made. *This may again be due to the assumption made earlier that the number of redundant cues in this experiment did not reach the optimal number beyond which the errors made will increase.*

Conclusion

This study has shown that adding redundant accounting information to diagnostic information did improve the accuracy of bankruptcy prediction, led to lower calibration, greater overconfidence, resolution and overall better performance in the probabilistic task presented to the loan officers, and did consume more loan officer time to process the data. The improvement in the quality of the decisions made by loan officers with the addition of redundant accounting information points to two tentative conclusions.

1. A small increase in the number of accounting cues, even redundant cues, may improve the quality of the decision in terms of accuracy and resolution. Future research may focus attention on the circumstances in which the addition of redundant cues may improve decision performance.

2. A certain level of information or number of accounting cues, even redundant cues, may exist beyond which the quality of the decision may cease to improve. Future research may focus attention on this aspect of the information load question, namely the impact of the *number* of cues, redundant cues added to diagnostic cues, on the

¹¹For a review of the literature on calibration, see Lichtenstein, Fischhoff, and Phillips [1977; 1982].

quality of decision making. The model suggested by Hogarth [1975] may be used to show analytically and empirically that, due to limits of information processing capacity, the quality of decision in terms of accuracy, calibration and decision times may be a concave function of task complexity where task complexity is defined to be an increasing function of both the number of cues (diagnostic and redundant) per alternative and the difficulty of choice between alternatives.

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CCA—A Proposal for Reform*

Jack Woodham

Introductory

Summary of Recommendations

The author will argue that the concentration of attention on current costs of assets has obscured the importance of the effect of general inflation elsewhere, and particularly on the real burden of loan debt, and has consequently led to an unacceptable capital gearing adjustment. He will advance the following propositions:

- (i) the capital gearing adjustment, as developed in SSAP 16, should be abolished;
- (ii) depreciation, based on current costs, is correctly to be shown in the accounts without abatement;
- (iii) accounts should include a new adjustment for the effect of general inflation on the real burden of loan debt. That adjustment would be correctly deductible from nominal interest;
- (iv) no capital gearing adjustment would then be needed and SSAP 16, so modified, would be equally relevant to the needs of commerce and industry, the public service corporations, and local government.

The Background to this Paper

The author has, at the request of the Chartered Institute of Public Finance and Accountancy, and with the support of a Steering Committee on which the Accounting Standards Committee was represented, researched into the practicability of adapting SSAP 16 for the purposes of local government non-trading services. These are distinguishable from the sort of entity to which SSAP 16 relates by the fact that, except to the extent to which it might be defrayed directly from current revenues, capital expenditure is wholly defrayed from loan debt; there is no equity capital. Clearly capital gearing adjustment, which arises from the presence of loan debt in an entity's financial structure, might be expected to be of particular importance in local government accounting, and such has proved to be the case.

Local authorities have not hitherto adopted CCA¹, presumably excused by para 46 of the

Standard as entities 'whose long-term primary financial objective is other than to achieve an operating profit.' Para 51, without exempting the nationalised industries from CCA, says that no capital gearing adjustment should be made in their profit and loss accounts 'in view of the special nature of their capital structure'. Thus a trading entity in the private sector with 99% loan capital would make a capital gearing adjustment related to that percentage, but a similar entity in the public sector with 100% loan capital, would make none at all.

This situation is disturbing. If, as the author believes, accountancy is indeed a science, then the existence of such a remarkable discontinuity in one of its systems must bring that system gravely into question. The author regards the wholly loan-financed entity as no more than the limiting example in a continuum which extends from the wholly equity-financed entity at one end of the spectrum to the wholly loan-financed at the other.

There will no doubt be those who question the relevance of SSAP 16 to local government on the ground that local government is 'different' from commerce and industry, though such critics fail to identify any 'difference' which is relevant to the accounting problem with which CCA grapples. What they need to demonstrate is that the accounting objective of CCA is not relevant to local government.

Unfortunately SSAP 16 nowhere states the accounting objective of the system; the references at para 5 to the information objective beg the issue. There are, however, many indications, such as the reference at para 4 to 'the amount of funds required to maintain the operating capability of the net operating assets', to furnish a clue to the underlying thinking. The author deduces that the accounting objective of SSAP 16 is to generate a cash flow sufficient, notwithstanding changing prices,² to ensure that physical capital can be continuously replaced.

In commerce and industry this means that profits should only be declared after provision has been made to maintain the stock of physical capital and that provision beyond that level would not constitute a proper charge against current profits. In local government it would mean that costs

*This article was accepted in July 1983.

¹Except to a limited extent, and for special purposes, in the accounts of trading undertakings and direct labour organisations.

²This paper deals only with the case where general prices are rising.

charged against current revenues must include such a provision, whether by way of depreciation or debt redemption is not relevant in this respect, but that no further charge in respect of capital funding, in effect no element of internal financing, should be made without specific managerial decision and report.

In this regard there are no differences between local government and private sector accounting. In this paper, therefore, local government will be regarded simply as the limiting example in the capital gearing continuum.

The second part of the paper will examine the local government situation in that light; the third part will examine the application in other sectors of the economy of the conclusions reached in the second part. This approach differs from that of Jones³ who examined the projection into local government of practices and principles derived from the private sector. If local government is indeed, as the author has claimed, the limiting example in a equity-financed to loan-financed continuum, the present approach would appear to have merit.

CCA and local government

Local government, apart from the general objection that its circumstances differ from those of the private sector, has raised two practical objections to the adoption of CCA, viz;

- (a) that inflation already gives rise to a premium in nominal interest rates; and
- (b) that current cost depreciation would unnecessarily (and incorrectly) increase the burden on the local revenues.

The Inflation Premium in Nominal Interest Rates

This criticism points to the premium which is widely accepted to be included, in times of inflation, in nominal interest rates. To pay that premium and also to provide depreciation on current costs would, the argument goes, impose a double charge on the ratepayers. This argument gives rise to two questions:

- (a) it ignores the presence of capital gearing adjustment. When quantified, would the latter be sufficient to eliminate the inflation premium?
- (b) would it be legitimate, whatever its magnitude, to regard capital gearing adjustment as an abatement of nominal rates of interest?

To these questions we shall return later.

The Extra Cost of CCA Depreciation

If a local authority adopts CCA, then depreciation based on current costs will necessarily be greater than the debt redemption charge under the present system. Since the latter does already redeem debt within the expected life of the asset, the argument goes, the extra burden of CCA depreciation is unwarranted. This argument gives rise to two questions similar to those asked above, viz:

- (a) it ignores the presence of capital gearing adjustment. When quantified, would the latter be sufficient to eliminate the extra charge?
- (b) is it legitimate, whatever its magnitude, to regard capital gearing adjustment as an abatement of depreciation, as SSAP 16 appears to do?

To these questions also we shall return later.

More basically, have we really two separate problems? Are the excess charge (if proven) imposed by CCA depreciation, and the inflation premium in nominal rates of interest independent, or are they the opposite sides of the same medal?

Concealed within the above discussion are two matters of accounting principle:

(i) *The matching principle*

- (a) SSAP 16, at para 17, states that the capital gearing adjustment 'abates the operating adjustments,' and these include depreciation (para 8). This would appear to constitute a breach of the matching principle, which unquestionably requires current revenues to be charged with depreciation based on current costs. No justification is advanced for such a breach. Unless the matching principle is rejected, then capital gearing adjustment must be something quite other than an abatement of depreciation and other operating costs.
- (b) If, on the other hand, capital gearing adjustment served to eliminate the inflation premium from nominal rates of interest, current revenues would still be charged with the real rate of interest,⁴ and it is arguable that, in an accounting system concerned with real as distinct from nominal costs, this would satisfy the requirements of the matching principle.

(ii) *The constant equity principle*

One of the discoveries made during the research was how easy it was, in the presence of an unstable unit of currency, for the accounting system *per se*, automatically, arbitrarily and without managerial knowledge or consent, to give rise to changes in the equity of an entity, equity here meaning the difference between the values of assets and

³Jones, Rowan H., 'Financial Reporting in Non-Business Organisations', *Accounting and Business Research*, Autumn 1982, pp. 287-295.

⁴See below.

liabilities. This would be quite unacceptable, and the author therefore postulated the constant equity principle,⁵ which would demand that the accounting system, even in the presence of changing prices, should not *per se* give rise to such changes.

The local government argument, that current cost depreciation imposes an unwarranted extra burden, as compared with debt redemption, on local revenues assumes new importance in the light of the constant equity principle. If a local authority finances a project costing £x out of a loan of £x, its initial equity is nil. If it then redeems the loan over a period coinciding with the expected life of the asset, as is the usual practice, then at the end of the asset life its equity, the argument goes, is again nil, and its financial position would appear to have been maintained. On the other hand current cost depreciation, which must exceed debt redemption, would enable debt to be redeemed in less than the life of the asset, so giving rise to a positive equity and defeating the constant equity principle.⁶ Thus, even though it would be incorrect to regard capital gearing adjustment as an abatement of depreciation, nevertheless an acceptable capital gearing adjustment must abate the cash flow sufficiently to avoid this infringement of the constant equity principle.

The discussion so far suggests that:

- (i) capital gearing adjustment, whatever form it may take, must not constitute an abatement of depreciation, or of any other operating cost;
- (ii) it is more likely to serve to eliminate the inflation premium from nominal rates of interest on loans;
- (iii) in such event, it would have to be related to the rate of general price inflation;
- (iv) it must be of such magnitude as to ensure, so far as the accounting system itself goes, that an entity's equity is maintained constant in real terms.

A New Approach

At the heart of the CCA system developed in SSAP 16 lies the implicit assumption that, provided the effects of specific price changes are taken into account, there is no need, except perhaps in MWCA, to take into account the effects of general price changes. The assumption is unwarranted, if only for the reason that a specific price change is itself a complex quantity, being the sum of (a) general price change and (b) relative price change. Thus, the effect of the SSAP's system is that, where specific price change is important, the accountant

does allow, *inter alia*, for general price change, since it is included in specific price change.

But where specific price change is not relevant, the accountant makes no allowance for general price change, however important it may be. This lack of symmetry lies at the root of the problem.

The effect of general inflation on the real burden of an entity's debt is easily demonstrated. A permanent loan of £1m may appear to have the same value year after year, but that is the classical inflation illusion. Since, in the presence of general inflation, the unit of account is changing from year to year, so also is the real value of the loan.

Thus:

- (a) in real terms, asset value is constant, but loan value is decreasing; or
- (b) in monetary terms, asset value is increasing, but loan value is constant.

In practical terms, this explains why depreciation calculated on current costs will be more than enough to service debt, the argument which the local government accountant, as we have already seen, has tended to use.

SSAP 16 clearly identifies this situation, even though it overlooks its full implications. For at para 6 it says: 'To the extent that the net operating assets of the business are financed by borrowing, the full allowance for the impact of price changes on operating capability made in arriving at an operating profit may not be required, *because the repayment rights of lenders are fixed in monetary amount*' (my italics). In the light of that statement we are entitled to ask what would be the extra burden if the repayment rights were not fixed in monetary amount. There can be only one answer: the extra burden would be the rate of general inflation applied to outstanding debt.

Here, then, is the first possible quantification of the new capital gearing adjustment, or of that which is to replace it. How does this accord with the contention that allowance should be made for the effect of general price changes on all balance sheet quantities, loans as well as assets? Obviously it accords exactly; the only way to allow for the effect of general price inflation on the real burden of debt is to apply the rate of general price inflation as a deflator of outstanding debt, which is also the conclusion to which para 6 of SSAP 16 would lead.

Equally, such an adjustment would eliminate the extra charge imposed by the presence of an inflation premium in nominal interest rates. So far as the market 'gets it right,' that premium must be the rate of general inflation applied to outstanding debt; so far as the market fails to 'get it right' the situation is no different from that in which the market fails to get rates of pay or any other costs or incomes 'right.' The accountant's job is to report what the market does, not what he may think it ought to do.

⁵cf Jones, Fn. 3 above.

⁶That argument has been stated in nominal terms, not in real terms, a weakness which will later be seen to be significant.

It may be objected that, to incorporate the effect of general price inflation on the burden of debt is to impart parts of the CPP system into CCA. What sort of objection would that be? The accountant's duty is to look at the real world in which an entity operates, and to measure and report on the performance of the entity in that world. Inconveniently, his measuring rod has become elastic, and if his report does not allow for that it will be nigh useless. And, even if that were not so, the dynamic of the economy would cause prices to change relatively to one another: another effect he dare not overlook. If some of these influences are handled in a system known as CPP, and others in a system known as CCA,⁷ then the accountant has no alternative but to reject both in favour of a system which faces all the facts, which is what is proposed here.

The problem has been approached above by way of the capital gearing adjustment since this is where criticism of SSAP 16 has tended to be concentrated. But there is a more satisfactory approach. In the presence of general price changes, which is to say when the unit of account, or measurement, is itself unstable, the values of both debt and assets are affected, though not necessarily to the same extent. In that circumstance it is no longer correct to charge revenues simply with the cost of maintaining assets at current costs; what is necessary is to charge revenues with the cost of so maintaining net equity, i.e. assets less debt. This is easily achieved by revaluing assets in the light of specific price inflation, and by 'revaluing' debt in the sense of the following paragraphs in the light of general price inflation. Provided both revaluations are carried out, there will be found to remain no place for a capital gearing adjustment.

It remains to examine the operation of such a system in practice. The worked example which follows is based on a seven year programme of investment of £3000 a year in real terms. With specific inflation of 20% a year this gives £3600 in year 2, £4320 in year 3, and so on. The general rate of inflation is assumed to be 10% a year, the difference between the two rates of inflation being great enough to bring out emphatically the consequences of such differences. Capital gearing adjustment will be replaced by a debt deflator, as already suggested. Backlog will be ignored since new investment each year will be at least as great as the cash flow generated by depreciation in the previous year, and will have the same specific price inflation index as the main investment, under which conditions it is easily demonstrated that no backlog problem can arise.

Table A is the seven year depreciation schedule, and needs little comment. Each asset is revalued by 20% each year, and depreciation is one third of the written-up value, i.e. for asset 1 it is one third of £3600, £4320, £5184 etc. This schedule is used for the development of Table B which shows the balance sheet over the seven year period, in which opening asset values and the yearly amounts for asset revaluation and depreciation are taken directly from Table A. Cash flow comprises a positive amount for depreciation, and a negative amount for the loan deflator, calculated at 10% of outstanding debt. A new loan is raised each year to make the cash flow up to the amount needed to finance the asset being bought. The usual CCA current cost reserve disappears in favour of a comprehensive inflation provision on the lines already suggested.

The outcome is seen in the fourth and following years, when:

- (a) depreciation cash flow each year would exactly finance the following year's asset;
- (b) the presence of the loan deflator necessitates a new loan each year of 10% of outstanding debt, so stabilising the real burden of debt;
- (c) the written-down value of assets is growing annually at 20%, so exactly maintaining the real value of the investment;⁸
- (d) no disposable revaluation surplus arises, since the whole amount of cash available at the end of each year is needed to finance the next year's investment if debt is to be held stable in real terms;
- (e) each balance sheet is drawn wholly in terms of the actual currency of the year of account, thus achieving a major objective of the accounting profession since the days of Sandilands.

An interesting and informative exercise is to examine the outcome when general and specific rates of inflation are the same. Every comment made in the foregoing would remain true, but the net inflation provision would be consistently nil. This is what would be expected, since the effect of specific asset price inflation is counterbalanced by the effect of the debt deflator, so that no net inflation provision is called for.

On the basis of this example, we may examine the distribution of costs over time, as shown below, on the assumption that the debt deflator is correctly deductible from nominal interest.

⁷The reader may think it improbable that there could be alternative solutions to a single numerical problem!

⁸Value to the business is taken throughout to be net current replacement cost. Alternative values are not examined.

Table A Depreciation Schedule									
Item		Asset 1	Asset 2	Asset 3	Asset 4	Asset 5	Asset 6	Asset 7	Total
Asset 1		3000							3000
Revaluation		600							600
		<u>3600</u>							<u>3600</u>
Depreciation		1200							1200
	c/d	<u>2400</u>							<u>2400</u>
Asset 1	b/d	2400							2400
Asset 2			3600						3600
Revaluation		480	720						1200
		<u>2880</u>	<u>4320</u>						<u>7200</u>
Depreciation		1440	1440						2880
	c/d	<u>1440</u>	<u>2880</u>						<u>4320</u>
Assets 1/2	b/d	1440	2880						4320
Asset 3				4320					4320
Revaluation		288	576	864					1728
		<u>1728</u>	<u>3456</u>	<u>5184</u>					<u>10368</u>
Depreciation		1728	1728	1728					5184
	c/d	—	<u>1728</u>	<u>3456</u>					<u>5184</u>
Assets 2/3	b/d		1728	3456					5184
Asset 4					5184				5184
Revaluation			346	691	1037				2074
			<u>2074</u>	<u>4147</u>	<u>6221</u>				<u>12442</u>
Depreciation			2074	2074	2073				6221
	c/d		—	<u>2073</u>	<u>4148</u>				<u>6221</u>
Assets 3/4	b/d			2073	4148				6221
Asset 5						6221			6221
Revaluation				415	829	1244			2488
				<u>2488</u>	<u>4977</u>	<u>7465</u>			<u>14930</u>
Depreciation				2488	2489	2488			7465
	c/d			—	<u>2488</u>	<u>4977</u>			<u>7465</u>
Assets 4/5	b/d				2488	4977			7465
Asset 6							7465		7465
Revaluation					498	995	1493		2986
					<u>2986</u>	<u>5972</u>	<u>8958</u>		<u>17916</u>
Depreciation					2986	2986	2986		8958
	c/d				—	<u>2986</u>	<u>5972</u>		<u>8958</u>
Assets 5/6	b/d					2986	5972		8958
Asset 7								8958	8958
Revaluation						597	1195	1792	3584
						<u>3583</u>	<u>7167</u>	<u>10750</u>	<u>21500</u>
Depreciation						3583	3584	3583	10750
						—	<u>3583</u>	<u>7167</u>	<u>10750</u>

Table B
CCA with Debt Deflator: Entity Wholly Loan Financed
Loans and Provisions

<i>Loans and Provisions</i>				<i>Assets</i>			
Loan 1		3000		Asset 1		3000	
				Revaluation		600	
						3600	
				Depreciation		1200	
						2400	
Inflation provision:				Cash: depreciation	1200		
Assets	600			debt deflator	- 300	900	
Debt	- 300	300					
		3300				3300	
Loan 1		3000		Asset 1		2400	
Loan 2	3600			Asset 2		3600	
						6000	
less cash	900	2700		Revaluation		1200	
		5700				7200	
				Depreciation		2880	
						4320	
Inflation provision:				Cash: depreciation	2880		
Assets	1800			debt deflator	- 570	2310	
Debt	- 870	930					
		6630				6630	
Loans 1/2		5700		Assets 1/2		4320	
Loan 3	4320			Asset 3		4320	
less cash	2310	2010				8640	
		7710		Revaluation		1728	
						10368	
				Depreciation		5184	
						5184	
Inflation provision:				Cash: depreciation	5184		
Assets	3528			debt deflator	- 771	4413	
Debt	- 1641	1887					
		9597				9597	
Loans 2/3		7710		Assets 2/3		5184	
Loan 4	5184			Asset 4		5184	
less cash	4413	771				10368	
		8481		Revaluation		2074	
						12442	
				Depreciation		6221	
						6221	
Inflation provision:				Cash: depreciation	6221		
Assets	5602			debt deflator	- 848	5373	
Debt	- 2483	3113					
		11594				11594	

Table B (cont.)							
<i>Loans and Provisions</i>				<i>Assets</i>			
Loans 3/4			8481	Assets 3/4			6221
Loan 5		6221		Asset 5			6221
less cash		5373	848				
			9329				12442
				Revaluation			2488
							14930
				Depreciation			7465
							7465
Inflation provision:				Cash: depreciation	7465		
Assets		8090		debt deflator	-933	6532	
Debt		-3422	4668				
			13997				13997
Loans 4/5			9329	Assets 4/5			7465
Loan 6		7465		Asset 6			7465
less cash		6532	933				
			10262				14930
				Revaluation			2986
							17916
				Depreciation			8958
							8958
Inflation provision:				Cash: depreciation	8958		
Assets		11076		debt deflator	-1026	7932	
Debt		-4448	6628				
			16890				16890
Loans 5/6			10262	Assets 5/6			8958
Loan 7		8958		Asset 7			8958
less cash		7932	1026				
			11288				17916
				Revaluation			3584
							21500
				Depreciation			10750
							10750
Inflation provision:				Cash: depreciation	10750		
Assets		14660		debt deflator	-1129	9621	
Debt		-5577	9083				
			20371				20371

<i>Depreciation</i>							
Year	1	2	3	4	5	6	7
Revalued assets	3600	7200	10,368	12,442	14,930	17,916	21,500
Depreciation	1200	2880	5184	6221	7465	8958	10,750
Dep. as % of assets	33½	40	50	50	50	50	50

<i>Interest</i>			
Year	1	2	7
Debt	3000	5700	11,288
Gross interest	$3000 \left[\frac{10+i}{100} \right]$	$5700 \left[\frac{10+i}{100} \right]$	$11,288 \left[\frac{10+i}{100} \right]$
Debt Deflator	$3000 \left[\frac{10}{100} \right]$	$5700 \left[\frac{10}{100} \right]$	$11,288 \left[\frac{10}{100} \right]$
True interest	$3000 \left[\frac{i}{100} \right]$	$5700 \left[\frac{i}{100} \right]$	$11,288 \left[\frac{i}{100} \right]$

This table, in which i is the true rate of interest, shows that the system gives, when the investment programme is complete, depreciation at a constant rate on the current cost of written-down assets; and gives interest, net of the debt deflator, at the market true rate on outstanding debt: subject always to the qualification made above.

The Inflation Provision: Realised and Unrealised Gains

I argue that the net inflation provision is indeed a provision, as distinct from a general reserve, on the ground that the provision each year is wholly and precisely earmarked to finance so much of the following year's investment as is necessary if debt is to be held constant in real terms. There is no element of unrealised gain, since the debt deflator has eliminated revaluation gains so far as these are related to assets financed by way of loan debt. What we are left with is simply the provision needed to finance the relative change of asset prices.

An interesting consequence is that the system would be equally applicable to the situation in which, in the complete absence of general price inflation, there were relative changes in asset prices. In its application to loan-financed entities, at any rate, the system enjoys advantages which neither historical cost accounting nor current cost accounting can claim.

Application to entities financed by both share and loan capital

In order to examine the operation of the system where loan finance no more than supplements share capital, table C has been prepared. It is based on the same programme of investment as table B, with the same rates of depreciation and of general specific price inflation. The initial asset is assumed to be financed as to two-thirds (£2000) by share

capital, and one-third (£1000) by loan. The entity is assumed to be profitless in the sense that there is no profit on the Profit and Loss Account after current cost depreciation, and nominal interest less the debt deflator has been charged. The table has been restricted to the first four years, since the operation of the system is wholly apparent by the fourth year.

The difference between tables B and C is already to be seen in year 1, when the cash flow is £200 greater than that in table B. This is the consequence of the reduction of the debt deflator from £300 to £100, the further consequence of which, however, is that cash raised in year 2 of table C from new shares plus new loans (£1600 plus £900) is £200 less than new loans raised (£2700) in table B. Thus the increased cash flow is immediately and wholly absorbed in financing capital outlay; it is in the nature of a capital reserve, not represented by liquid assets, and not available for distribution. It is the unrealised gain from that part of the capital which has been financed from shares and not from loan. This reserve has, for purposes of illustration, been absorbed in this exercise in making a scrip issues to shareholders. This has the effect of keeping the nominal amount of share capital constant in real terms (in a non-profit situation),⁹ introducing an interesting parallel with the course of loan debt.

In subsequent years, until the investment programme is complete, new assets are financed as to two-thirds and one-third by share issues or loans respectively, so far as the cash flow of the preceding year falls short. The inflation provision builds up, as it must do, exactly as in table B provided an amount equal to 10% of nominal share capital is carried to capital reserve and/or used for a further scrip issue. The arithmetic is shown for years 1 and 2 only.

⁹This in no way constitutes a concession to the proprietary concept; the exercise is firmly based on the entity concept.

Table C
CCA with Debt Deflation: Entity Partly Equity, Partly Loan Financed
Capital Loans and Provisions

			<i>Assets</i>	
Share capital	2000		Asset 1	3000
Do—scrip issues	200	2200	Revaluation	600
				3600
Loan		1000	Depreciation	1200
				2400
Inflation provision:				
Assets 600			Cash: depreciation	1200
Debt —100			debt deflator	—100
Scrip —200		300		1100
		3500		3500
Share capital	2200		Asset 1	2400
Do—new	2400 ¹		Asset 2	3600
less cash	800 ²	1600		6000
Scrip		380	Revaluation	1200
Loan		1000		7200
			Depreciation	2880
new loan	1200 ³			4320
less cash	300 ⁴	900	Cash: depreciation	2880
Inflation provision b/d		300	debt deflator	—190
Assets		1200		2690
Debt		—190		
Scrip		—380		7010
		930		7010
		7010		
Share capital	4180		Assets as in Table B	5184
Do—new	960			
Scrip	514	5654		
Loan	1900			
new loan	670	2570		
Inflation provision b/d	930		Cash: depreciation	5184
Assets	1728		debt deflator	—257
Debt	—257			4927
Scrip	—514	1887		
		10111		10111
Share capital	5654		Assets as in Table B	6221
Do—new	—			
Scrip	565	6219		
Loans	2570			
new loan	257	2827		
Inflation provision b/d	1887		Cash: depreciation	6221
Assets	2074		debt deflator	—283
Debt	—283			5938
Scrip	—565	3113		
		12159		12159

Notes

¹2/3rds of asset £3600.

²2/3rds of depreciation £1200.

³1/3rd of asset £3600

⁴1/3rd of depreciation: £1200, less debt deflator £100.

By years 3/4 depreciation is exactly sufficient to finance the next year's investment. The debt deflator, however, causes loan debt to rise, in nominal terms, by 10% a year, while a yearly scrip issue, absorbing the capital reserve, has the same effect on nominal share capital. In all basic respects the two balance sheets, in tables B and C, representing the public and private sectors respectively, are behaving in the same way. In practice it would be inconvenient to make a yearly scrip issue, in which case the amounts so used in this exercise would be held in capital reserve. It would still be necessary to hold the inflation provision at its table B level by transferring yearly surpluses to capital reserve, which would then itself grow at 10% per year.

In broad terms, what is happening is:

- (i) the company is indexing the nominal amount of its share capital, or of share capital plus capital reserve, after which dividends in depreciated currency will be compared with equity valued in the same currency;
- (ii) by paying the inflation premium in nominal interest on loans the company is providing the cash flow out of which loan-holders, as a class, can maintain the real value of their investments, notwithstanding the effects of currency depreciation.

Profits

In real life, cash flow would be affected by profits/losses in the sense used at the beginning of this section. These should be carried to a free reserve, and must not be allowed to affect the inflation provision. They might be used in due course to repay debt or to finance capital developments which would otherwise have called for a share issue. In either such event the amount so used must be transferred from the general to capital reserve,¹⁰ and at some convenient time absorbed by a scrip issue.

Unrealised 'Gains'

These are the consequence of currency depreciation, not of relative price changes. The system therefore handles them comprehensibly and elegantly thus:

- (i) for the wholly loan-financed entity unrealised 'gains' are eliminated by the debt deflator;

- (ii) in the equity/loan financed entity, so far as they are not eliminated by the debt deflator, they are earmarked in capital reserve and, ideally, frozen by way of scrip issue.

The Inflation Provision

This is progressively credited with the difference between specific and general inflation, as applied to net current cost asset values. It thus ensures that funds are available to replace assets at their current costs, however greatly their rate of price change exceeds that of general price change. In the going concern situation it is at all times wholly earmarked for asset replacement. In the event of winding-up, however, it should enable shareholders to receive a distribution much more closely related to current price levels than they might receive under historical cost accounting. On winding-up, of course, the whole net proceeds would accrue to the shareholders, who would benefit accordingly from the gearing in the company's finances.

Other Components of CCA

This paper has been confined to the treatment, in the presence of general and relative price inflation, of assets, loans, and related cash flows, reserves and provisions. In particular, it has not looked at the problem of MWCA, which in no way implies that this should not be done. On the contrary, the SSAP 16 recommendations for MWCA should be closely examined in the light of the general proposition that, quite apart from the relative price changes of fixed assets, every component of MWCA is exposed to the influence of an unstable unit of account.

Conclusion

This paper has demonstrated that, once capital gearing adjustment has been replaced by a debt deflator, then it becomes possible for the CCA system to be used in a manner wholly relevant to the needs of loan-financed entities at one end of the capital finance continuum, for equity-financed entities at the other end, and for entities financed partly by the one and partly by the other, and this regardless of the nature of their business. Local authorities, in both their trading and their non-trading services, public corporations, limited companies: all are equally well catered for, and this in a system which uses the actual currency of the day throughout.

¹⁰There is an interesting parallel in local government accounts, where the reserves invariably include an item: 'Revenue contributions to capital outlay.'

International Accounting Education: A Survey of University Courses in the UK

S. J. Gray and C. B. Roberts

Surveys of 'international accounting' education in the USA have shown that this is a subject which has become much more popular in recent years. In 1969, for example, Terpstra¹ conducted a survey of 95 universities and found that 17 offered courses in international accounting, whilst in 1979 a survey by Mintz² of 98 universities found that 42 offered such courses. Similarly, in the UK, the authors' recent survey of 32 universities shows a marked increase from 3 universities in 1969 to 13 universities offering one or more courses in 1981.

The purpose of this article is to report the results of this survey of UK universities and to examine briefly the extent to which international accounting has emerged as a significant field of study in this country in comparison with the USA.

The teaching of international accounting

Many writers (e.g. Parker³, Choi⁴) have shown that there are several important reasons for studying the international aspects of accounting, perhaps most importantly the growth of multinational corporations. It is not at all surprising, therefore, that the subject is undergoing rapid development. But at the same time there have been problems as to how to teach the subject effectively.

There would seem to be two major approaches: either to treat it as a distinct area with special courses or to include international topics as an extension of domestic topics, e.g. consolidation accounting would be extended to cover accounting for foreign subsidiaries and problems of foreign currency translation.⁵

The second, more integrated, approach is being introduced to an increasing extent and may well be more effective if carried out comprehensively. However, at the moment this is rarely the case. There are a number of reasons for this including:

- (1) lack of suitable textbooks—very few attempt to integrate international aspects;
- (2) lack of teachers who can integrate at all levels and for all areas;
- (3) lack of time available in existing courses.

At the moment, therefore, it would appear that more rapid progress can be made by setting up special courses, usually as options at the senior undergraduate or postgraduate level. However, there are problems here, too, with a lack of suitable specialist textbooks and qualified teachers, although the situation is improving and at an increasing pace.

An important development in this regard has been the establishment of a number of specialist research centres. In the USA, centres at the University of Washington and University of Illinois established in the mid 1960s have been followed more recently by centres at the University of Texas at Dallas, California State University at Northridge and the University of Connecticut. In the UK, the International Centre for Research in Accounting (ICRA) was established at the University of Lancaster in 1971.

These centres have provided a major contribution to the growing number of researchers and teachers who have set up courses, encouraged colleagues, produced teaching materials and started to write textbooks, thus providing an important impetus for development.

In the 1960s there was only one major text in international accounting—a pioneering contribution by Mueller in 1967.⁶ A further significant contribution to the subject was made by Zeff⁷ in 1972. But since 1977 at least seven textbooks have been produced including Choi and Mueller in 1978⁸ and two new ones published in 1981 by

¹Terpstra, Vern., *University Education for International Business* (Association for Education in International Business, 1969).

²Mintz, Steven M., 'Internationalization of the Accounting Curriculum', *International Journal of Accounting* (Fall 1980) pp. 137–151.

³Parker, R. H., 'Some International Aspects of Accounting', *Journal of Business Finance* (Winter 1971) pp. 29–36.

⁴Choi, F. D. S., 'Multinational Challenges for Managerial Accountants', *Journal of Contemporary Business* (Autumn 1975) pp. 5–16.

⁵Radebaugh, Lee H., 'The Development of International Accounting Education' in F. D. S. Choi (Ed), *Multinational Accounting: A Research Framework for the Eighties* (UMI Research Press, 1981) pp. 73–86.

⁶Mueller, Gerhard G., *International Accounting* (Macmillan, 1967).

⁷Zeff, Stephen A., *Forging Accounting Principles in Five Countries: A History and an Analysis of Trends* (Stipes, 1972).

⁸Choi, F. D. S. and Mueller G. G., *An Introduction to Multinational Accounting* (Prentice-Hall, 1978).

Arpan and Radebaugh⁹ in the USA and Nobes and Parker¹⁰ in the UK.

A survey of international accounting courses

To obtain information about existing and anticipated courses in international accounting, a questionnaire was sent to all UK universities offering courses in accounting/finance in the academic year 1981/82. The objective was to discover both the extent to which international accounting was taught in the UK and the specific topics covered by courses in this area.

Replies were received from 32 (84%) of the total population of universities. Altogether, there were 13 universities (41%) offering special courses in international accounting.

A further 5 universities planned to start at least one course within the next 3 years. In addition, a small number of universities indicated that some international accounting topics were integrated with domestic topics. Between them, the universities provided a total of 16 different courses. These were split nearly evenly between undergraduate and postgraduate (see Table 1). However, only three universities offered international accounting courses at both levels. This situation differs markedly from the USA where Mintz¹¹ found that of 46 courses offered, 31 were for postgraduates only and 7 available to both postgraduates and undergraduates. Burns¹² found very similar results—of 39 courses offered, only 7 were purely for undergraduates.

Whilst the number of courses offered at undergraduate and postgraduate levels are approximately equal in the UK, the same is not true of the importance of such courses. The importance

attached to a subject can be measured by the amount of teaching time involved or, perhaps more significantly, by the amount that the course contributes towards the final degree. Using each of these measures a similar picture to the USA is found—international accounting is much more important at the postgraduate level. Considering first the numbers of contact teaching hours it was found that, on average, at undergraduate level the time spent on international accounting courses is 22.7 hours. For postgraduate courses the time spent is 29.4 hours. When the contributions of courses to the degree award are examined, however, international aspects appear to be about three times more important in the context of postgraduate degrees. For undergraduate degrees, international accounting contributes 4.4%, on average, with the highest contribution being 8.5%. For postgraduate degrees, the respective figures are 13% and 42%.

Although comparable figures are not available for the USA these results seem to support the USA finding of international accounting being taught primarily at the postgraduate level.

The universities offering courses/modules in international accounting were also asked to estimate the percentage of all course time spent on a range of topics including those incorporated in the earlier USA studies as well as topics covered in recent international accounting textbooks. The results are presented in Table 2 and show the rankings, by the mean percentage of time spent on each topic, for undergraduate and postgraduate courses separately, as well as in aggregate.

Although the categories differ to some extent from those of Mintz and Burns, several interesting comparisons can be made. On the whole, the relative importance of the different topics is broadly similar, e.g. all three studies show comparative accounting principles to be the most highly ranked topic. The main differences in the rankings in the UK compared to the USA are in the areas of foreign currency translation which is ranked fifth (behind international accounting harmonisation) compared to being ranked second in the USA; EEC accounting which is apparently of no special significance in USA courses; inter-

⁹Arpan, Jeffrey, S., and Radebaugh, Lee H., *International Accounting and Multinational Enterprises* (Warren, Gorham and Lamont, 1981).

¹⁰Nobes, C. W. and Parker, R. H. (Eds), *Comparative International Accounting* (Philip Allan, 1981).

¹¹Mintz, Op. cit (1980).

¹²Burns, Jane O., 'A Study of International Accounting Education in the United States', *International Journal of Accounting* (Fall 1979) pp. 135–145.

Table 1
UK Universities offering courses in international accounting in 1981/82

	<i>Under-graduate</i>	<i>Post-graduate</i>	<i>Both UG and PG</i>	<i>Total</i>
Existing courses:	6	4	3	13
Planned courses (within 3 years)	3	2	—	5

Table 2**Time allocation: international accounting topics**

	<i>Undergraduate</i> %	<i>Postgraduate</i> %	<i>Combined</i> %
Comparative accounting principles & reporting practices	21.8 (10-44)	21.7 (10-72)	21.8
Patterns of accounting development	10.6 (0-20)	12.5 (0-28)	11.8
International financial markets and financing decisions	7.0 (0-25)	17.7 (0-47)	11.6
International accounting harmonisation	12.7 (5-16)	6.0 (0-15)	9.8
Foreign currency translation	8.5 (0-20)	7.1 (0-16)	7.8
EEC Accounting	11.0 (0-20)	3.0 (0-10)	7.4
MNC disclosures	8.3 (0-30)	4.5 (0-17)	6.6
Consolidations	4.5 (0-10)	4.9 (0-16)	4.7
Foreign investment decision-making	0.2 (0-2)	7.7 (0-50)	3.4
International taxation	1.1 (0-10)	5.4 (0-20)	2.9
Transfer pricing	3.3 (0-10)	2.0 (0-8)	2.8
Accounting in communist countries	4.7 (0-10)	0.1 (0-10)	2.7
Accounting in developing countries	2.6 (0-10)	1.7 (0-10)	2.2
Inflation accounting	1.7 (0-5)	1.6 (0-10)	1.6
International auditing	—	3.0 (0-15)	1.3
Performance evaluation of foreign subsidiaries	—	1.1 (0-8)	0.5
Miscellaneous	2.0 (0-10)	—	1.1

Note: figures in brackets are the ranges of time percentages allocated to specific topics.

national financial markets and financing decisions which is ranked third in the UK but did not specifically appear in either of the USA studies (possibly because it is usually included in courses in international finance); and finally inflation accounting which ranked fourth in both USA studies with means of 7.5% (Burns), and 7.8% (Mintz) but only fourteenth (mean 1.6%) in the UK.

Future prospects

In view of the growing significance of the international aspects of accounting, it seems likely that we will continue to see a further development of special courses in international accounting particu-

larly at the postgraduate and senior undergraduate level. In the longer term, it can be expected that there will be some greater movement towards a more integrated approach whereby international aspects are incorporated into existing courses currently concerned with purely domestic issues. At the same time, there will always, no doubt, be room for courses on some specialist international aspects with particular reference to the study of factors influencing the development of accounting in different countries—a subject termed by Seidler¹³ as 'the ultimate theory' course.

¹³Seidler, Lee J. 'International Accounting—the Ultimate Theory Course', *The Accounting Review* (October 1967), pp. 775-781.

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Corporate Financial Reporting and the Small Independent Company

Michael J. Page

The Companies Act 1981 (the 1981 Act) introduced a three-tier size classification of companies with the aim, *inter alia*, of easing the accounting burden on small firms (The Treasury, 1981). Legislation in this area arose from the interaction between the need to enact the provisions of the EEC Fourth Directive on Company Accounts and a climate of policies favourable to small businesses generally. The Act was preceded by a period of intense discussion within the accounting profession about appropriate financial accounting requirements for small companies. The discussion covered all aspects of financial reporting but emphasised the question of whether small companies need an audit, a question explicitly posed by a Department of Trade Green Paper, *Company Accounting and Disclosure* (GB Dept of Trade, 1979).

Before the 1981 Act a uniform standard of disclosure was required of all companies, subject to some minor concessions. The same information was presented to shareholders and the public via the filing of accounts with the Registrar of Companies. Following the Act, small companies may file 'modified' accounts with the Registrar containing much less information, but they are required to present full accounts to shareholders. An audit is still required for all companies.

Is this change really likely to achieve its object of 'easing the accounting burden' on small companies? Financial reporting is burdensome because it involves costs in preparing and auditing the information; because the business may suffer from the disclosure of information, typically to its competitors; and because the proprietors may find disclosure intrusive into their private financial affairs. Even so there seems to be general agreement that some form of financial reporting by small companies should be required and in any event there is a minimum disclosure standard imposed by the EEC Fourth Directive.

The purpose of this paper is to examine issues relevant to small company financial reporting and to present the results of two surveys: a survey of the accounts of a sample of companies; and a postal questionnaire survey of directors of small

independent companies. The surveys were made before the 1981 Act was passed.

Subsequent sections of the paper deal with the background to the problem, the research approach, survey results and conclusions. The paper is part of a project which was supported financially by the Institute of Chartered Accountants in England and Wales (ICAEW) but this does not indicate ICAEW support for any opinions expressed.

Background

Users of Information

An audit has been compulsory for all companies, unlimited as well as limited, since 1900 but the requirement for disclosure by all small private companies dates only from the coming into effect of the Companies Act 1967. Who uses this carefully prepared, verified and published information? The well-known *Corporate Report* (ASSC, 1975) list of groups of users of accounts was: equity investors; loan creditors; employees; analysts/advisers; business contacts (including trade creditors); government; the public. To this list may be added company managements since they may also use the accounts. The intensity of use by different groups of users is likely to be different for small private companies as compared with large public companies. Where there is no public disclosure the only groups which receive the information as of right are management, shareholders and perhaps agencies of government, for example the tax authorities. Where public disclosure is made the other user groups have access to the information as well as groups not explicitly mentioned by the Corporate report, in particular competitors.

For most small companies, shareholders and business contacts are the groups whose interests are most affected by reporting requirements: loan creditors, e.g. banks, may obtain financial information as a precondition of granting a loan, employees have personal contact with the proprietors and the role of the analyst/adviser group is very restricted where there is no public market for the

company's securities. Accordingly the work which follows concentrates primarily upon the relationships between the company and its directors, shareholders and business contacts.¹

Prior to the 1981 Act there was surprisingly little discussion of the actual contents of the information to be disclosed by companies. Little of the published comment on the Green Paper was about, for example, the radical proposal to dispense with filing of profit and loss accounts. For example neither the Consultative Committee of Accountancy Bodies (CCAB, 1979) nor the Confederation of British Industry exhibited much intensity of concern on the matter: the CCAB recommended retention of the profit and loss account; the CBI recommended the abolition of the requirement for its disclosure, but neither body advocated its position strongly. No definitive analysis of response to the Green Paper has been published but it is believed that the opinions of commentators about the requirement to file profit and loss accounts was evenly balanced.

Much more attention was directed to the question of whether an audit requirement should be imposed upon small companies. In the period leading up to the Green Paper the Auditing Practices Committee (APC) of the CCAB had issued 'Discussion drafts' prior to issuing *Auditing Standards and Guidelines* (APC, 1980a). Emphasis was placed upon construction of a network of evidence supporting the audit opinion. The need for evidence produced a problem which is still unresolved. Small companies do not possess, or require, the elaborate system of internal control which produces adequate evidence of all transactions. In particular, without formal division of duties it is difficult to show that accounts record all the transactions of the business. Davison (1979) went so far as to say that 'The probability is that many small businesses are unauditable in the sense the new Discussion Drafts define an audit.' Because of this problem APC (1980a) suggested that audit reports on small companies should draw attention to the lack of internal control. Auditing guideline 501 subsequently contained a recommended audit report for use in such situations. Company law requires the auditor to form an opinion on a company's accounts, but it appears that in many cases he is unable to do this validly.

Empirical investigation of opinion about whether small companies needed an audit was

slight. Prior to the 1981 Act the APC issued a discussion document (APC, 1979) which set out various arguments for and against the small company audit and asked for comment. Responses to the discussion document (APC, 1980b) were divided equally between those who favoured retention of the audit and those who wanted a different regime. It appeared that most retentionists found it acceptable that a significant number of small companies would receive qualified audit reports whereas most abolitionists favoured a review, but wanted a narrower definition of 'small company' than that proposed in the Green Paper.

In another study a readership poll conducted by *Accountancy* discovered little support by respondents for complete abolition of the audit but some support for a compulsory review. Support for the *status quo* was however stronger than support for a review but did not constitute a majority of respondents. Finally, the survey by the CBI (1980) of some of its smaller corporate members found a degree of concern about public disclosure and the need for the audit as an influence upon their business. Thirty percent of the 71 respondents considered public disclosure 'unhelpful' to their business and cited the need for an audit as a 'problem.'

There are obvious methodological reservations about the above studies.

Research approach

The questions addressed come under the following headings:

- (1) What constitutes a small company?
- (2) Who are the users of small company accounts and what is the relative intensity of use of the accounts among them?
- (3) What information do users require in making their decisions?
- (4) What purpose does validation of the accounts by means of an audit or review procedure serve?

The work reported here concentrated on the companies themselves and the perceptions of directors. A parallel survey, not reported here, investigated the perceptions of auditors of small companies. Data were derived from a random sample of 1000 companies in the Register of Companies. From the sample the active companies, independent of holding companies, were selected as the sample for analysis. The sample was generated by random selection of fiche, page and line position from the microfiche index of companies for March 1979, so that a representative sample of all companies in England and Wales irrespective of size or ownership was achieved. Table 1 shows the analysis of the sample into different categories.

The sample of directors was achieved by selecting one director from each of the 413 active

¹This seems consistent with the report of the influential Jenkins Committee (Company Law Committee, 1962) which advocated the abolition of exempt private company status and with it exemption from filing accounts, principally in the interest of 'those who have dealings' with such companies, that is to say 'business contacts.' The Jenkins Report also suggested that the record keeping of small companies would be improved by the requirement to file accounts.

Table 1
Classification of companies obtained in the sample of 1000 companies

	<i>Number</i>	<i>%</i>
Active independent companies	413	41
New companies—no accounts	231	23
Subsidiaries	154	15
In process of winding up	86	9
Dormant companies (excluding subsidiaries)	51	5
Listed companies, charities etc.	16	2
Insufficient information to determine status	49	5
	<u>1000</u>	<u>100</u>

independent companies in the sample of companies. Generally each of these companies had more than one director, in which case the questionnaire was sent to the director holding most shares. In the event of equal largest holdings, if no director was identifiable as the senior director (e.g. designation as 'chairman' or 'managing director') random selection was used. There is thus a higher probability of selecting people who head more than one company, but it does not seem to be significant in the final sample.

Survey of companies' annual returns

The Nature of Small Companies

Although it is difficult to obtain up to date descriptive statistics of small business and small companies the report of the Wilson Committee (1979), referring back to the work of the Bolton Committee (1971), suggests that small business accounts for about one quarter of private sector employment and of this 80 percent is accounted for by companies. In terms of numbers of companies there has been an increase over a long period. At 31 December 1979 there were 785,688 companies on the register of which 59,011 were in liquidation or course of removal (GB Dept of Trade, 1981).

Many of the remaining companies were either dormant or subsidiaries of other companies but

nevertheless, as Table 1 shows, after discarding different categories of companies which are either not independent commercial organisations or about which information is not available, about 41% of companies may be regarded as active and independent.

Previous work by Jones (1979) has shown that, as might be expected, the distribution of sizes of companies, however measured, is highly skewed. Jones used capital employed (rather than the size measure subsequently introduced by the Act—'balance sheet total') as the measure of size for his sample and the author's sample is consistent with a sample drawn from a similar parent population to that reported by Jones. Table 2 shows a frequency distribution for capital employed (under the Jones definition) of the sample companies.

As defined by the 1981 Act, a 'small' company is essentially one which does not exceed two of the following three thresholds: balance sheet total—£700,000; turnover—£1,400,000; total employees—50.

It is not possible to decide exactly which companies would and which would not be 'small' under this definition for the accounting period analysed, since the number of employees is not necessarily stated, but it is plain that very few active independent companies would be defined as even medium-sized. There were no top tier companies in the sample.

Table 2
Analysis of capital employed of sample companies

<i>Size Band</i> <i>£000</i>	<i>Capital Employed</i>				<i>Total</i> <i>Number</i> <i>%</i>	
	<i>Number</i>	<i>%</i>	<i>Non-manufacturing</i> <i>Number</i>	<i>%</i>		
250-4000	6	7.8	8	2.4	14	3.4
100-249	6	7.8	13	3.9	19	4.6
10-99	36	46.7	152	45.2	188	45.5
1-9	17	22.1	122	36.3	139	33.7
0-1	6	7.8	27	8.0	33	8.0
Negative	6	7.8	14	4.2	20	4.8
	<u>77</u>	<u>100.0</u>	<u>336</u>	<u>100.0</u>	<u>413</u>	<u>100.0</u>

Table 3
Control of small companies

Proportion of share capital	Percentage of sample where given proportion of share capital held by		
	shareholders		directors
	Top 2	Top 5	
under 10%	0.2	0.0	2.7
10-49.9%	3.9	0.5	6.1
50-74.9%	18.4	1.7	9.6
75-89.9%	11.9	1.2	6.3
90-99.9%	9.9	3.4	10.7
100%	55.7	93.2	64.6
	100.0	100.0	100.0

Top 2 or 5 = 2 or 5 shareholders having largest holdings

Financing and Profitability of Small Companies

Comparison of the aggregate financial structure of the companies with that found by Jones for small companies (Appendix 1) confirms Jones' findings for small companies that, as compared with large companies:

- (1) shorter term assets and liabilities are more prominent;
- (2) small companies are net receivers of trade credit;
- (3) small companies are more dependent on bank overdrafts and loans;
- (4) small companies are more dependent on equity (including directors' loans).

Jones also found that small companies have a higher return on net assets than large companies but that inter-company variability of return is higher among small companies and averages are distorted by a few companies with very high returns.

Ownership and Control of Companies

Since shareholders are given privileged treatment by the Act, the concentration of ownership and the extent of the interest of non-director shareholders is important in assessing the appropriateness of reporting requirements. Table 3 shows that control of small companies is highly concentrated and overwhelmingly in the hands of directors.

In 95.9% of cases 50% voting control is in the hands of the two shareholders owning most shares and in 77.5% of the cases these two shareholders have the almost complete control given by possession of 75% or more of the share capital. Similarly directors owned 50% or more of the shares in all but 8.8% of cases and in 64.6% of cases had total control. Although companies are now allowed to produce modified accounts for public filing, if this pattern of ownership persists they will be required to produce full accounts for share-

holders even though in almost two-thirds of cases all shareholders are directors.

Audit

All company accounts are required to be audited by a qualified accountant. In at least 87% of the sample this was done by chartered accountants. The audit report is designed as additional protection for the user of accounts since not only does the existence of the audit reduce the frequency with which misleading accounts are issued but also the audit report is supposed to provide an indication of the reliability of the accounts.

The audit report was qualified in only 5.8% of cases, mainly because of insufficient internal control or inadequate books and records kept by the company. Adherents to the argument that poor internal control is a major problem in auditing small companies would probably therefore conclude that many unqualified audit reports were given where adequate evidence to support the auditor's opinion did not exist.

Survey of directors

A response rate of 41% was achieved from the postal survey of one director from each member of the sample of 413 active independent companies analysed in the previous section.

This is a respectable response rate for a postal survey but two sorts of checks were carried out for evidence of non-response bias:

1. Cross-correlation between response and the known details of companies failed to find any association between size or industry and response to the questionnaire.
2. Cross-correlation of answers about the advantages and disadvantages of incorporation similarly failed to distinguish between early and late responders.

There was however a correlation between response and up-to-dateness of accounts on file at Companies House; companies with very out of date accounts tended not to respond. This may be accounted for, at least partially, by the observation that many such companies have effectively ceased trading and are eventually struck off.

The questionnaire and marginal responses are set out at Appendix II.

Small Companies and the Corporate Form

The main advantage that directors saw as being attached to running their business as a company was limitation of liability [Q1]. This aspect of companies has been afforded lower importance than hitherto in some recent writings (e.g. APC, 1979), since it has been felt that the personal guarantees demanded of directors by lenders, particularly banks, have to a certain extent vitiated the protection of limited liability.

Tax savings were considered by 16% of respondents to be the main advantage of the corporate form, only slightly more than those who thought the ability to raise finance and ease of transfer of ownership were the main advantages. The fact that tax savings were not considered very important may be due to the small size and low level of profits of small companies and if so suggests that directors are reasonably aware of their tax position. The removal of many of the tax advantages of companies with the reduction in tax rates on high individual incomes in the 1979 Finance Act may be relevant to this view. (But the 1984 Budget may have changed this again.)

Respondents' view of the advantages of incorporation were not associated with age, expertise or accounting experience at significant levels.

'Government form filling' was seen as the main disadvantage of running a company by 44% of respondents [Q2]. Although the audit (because of costs) or disclosures (because of exposure to competitors) are both potentially burdensome, it appears that directors perceive the demands upon their time arising from administrative matters connected with government departments as more burdensome.

The government has recognised the existence of such a burden by introducing measures to restrict the demands for information from small businesses, yet the importance accorded to the imposition of bureaucratic requirements is somewhat surprising. Further investigation of the demands considered particularly irksome would be interesting, and it is possible that many of the returns required are common to unincorporated businesses, for example those connected with value added tax or employment legislation.

The overt cost of an audit did not rank as the main disadvantage so frequently as the hidden cost of disclosure. This is however consistent with the

large proportion of respondents who indicated that they would continue to have an audit even if this were not compulsory. Cross analysis of the disadvantages of the corporate form with the possibility of audit removal showed that there was significant association between the opinion that audit was the main disadvantage of the corporate form and wishing to dispense with the audit.

Usage of the Accounts

Directors were asked to rank uses (and, by implication, users) of their company's accounts in order of importance [Q3]. The overall order of importance offered by respondents is identical whether on the basis of the number of first ranks accorded by respondents or on a weighted score. (See notes to Appendix II for a description of score calculations.) The function of management information is accorded highest priority. This is somewhat surprising since it is widely recognised that the infrequency and delay of production of annual accounts severely limits their usefulness for decision and control.

Other functions of the annual accounts which were accorded importance were as support for tax computations and as information to the bank (or other providers of finance). Low priority was given to the use of the accounts made by shareholders, but as shown above directors are usually the major (if not the only) shareholders in small companies.

Given the importance accorded to business contacts, primarily trade creditors, in requiring disclosure of accounts, directors were asked, as business contacts of other companies, how they assessed 'credit worthiness.' Only 9% of respondents asked to see accounts regularly; a possibly overlapping 12% used a credit reference agency, which would probably use information derived from accounts among other things in arriving at its reference [Q4]. In terms of sporadic rather than regular use, a higher percentage of respondents claimed to have used the publicly filed information about a business contact company; 24% said they had cause to 'search' one or more companies within the year prior to response [Q5].

The significance of the responses to the two questions is hard to assess. They do not support the view that publicly disclosed accounting information is a regular tool in the small businessman's credit granting decisions, but conversely it is difficult to write off accounts as useless and unused.

The directors were asked what financial aspects of other companies they were able to assess by reading financial statements [Q6]. Only 'profitability' was rated as 'realistically assessable' by a majority of respondents claiming to read other companies' accounts; other aspects achieved about a quarter positive response. The 'financial aspects' are taken from a list generated by Lee & Tweedie (1977) in their survey of private shareholders.

Without taking the analysis of a rather general question too far, the results are broadly comparable with the findings of Lee & Tweedie (p 120) and may suggest rather low effectiveness of published accounts in communicating information important for business decisions. Consistent with the above result, when asked which information was considered most important for business decisions 'net profit' was considered most important [Q7]. Very little importance was accorded to 'source and application of funds'.

In relation to private investment decisions, directors seemed similar to the private shareholders surveyed by Lee and Tweedie [Q8]. The majority (55%) of respondents had no investment in listed companies. This is not unexpected and in fact indicates a higher rate of share ownership than within the population at large; on the evidence of the Diamond Commission (Royal Commission on the Distribution of Income and Wealth, 1975), it is probable that less than 10% of taxpayers own listed shares. Of the respondents who by implication held listed shares, 56% claimed that they found the accounts useful in making investment decisions. Lee and Tweedie (p 5) found that of the 67.9% of survey respondents who indicated that they understood financial information 58% found it relevant to their investment decisions.

Competitors

Against the arguments for disclosure of information it is sometimes suggested that disclosure is undesirable because it releases information to competitors and is intrusive into the owners' private affairs. In order to evaluate the likely importance of the former effect, directors were asked whom they regarded as their main competitors. A high response indicating other small businesses as main competitors would suggest that there would be an element of reciprocity in disclosure since at least other competitors would be of comparable size and face the same combination of factors when deciding whether to opt for limited liability status, including disclosure. However, although more respondents considered small local business as their main competitor than any other category, taken together large local businesses and large national businesses were regarded as more important competitors. It is possible therefore that disclosure may reveal information to large competitors with no corresponding reciprocal disclosure, since the information disclosed by larger businesses is at a higher level of aggregation. Yet to the question [Q10] asking whether publicly available information had been used to the company's disadvantage only 17 respondents (10%) answered positively. Seven gave no details of the instance(s), five mentioned use for the information by business contacts, two cited approaches to purchase the company and three quoted cases of the informa-

tion being used in credit evaluation. The last two types of information use are not necessarily against the company's interests. Altogether there does not seem to be extensive experience of identified harm arising from disclosure of financial information.

Attitudes to Disclosure

From the above analysis it might be expected that directors would be hostile towards disclosure, but this was by no means universally so. Question 11 asked directly whether directors wanted more, the same or less disclosure. Fifty-two per cent wanted less disclosure. With respect to disclosure of particular figures in the accounts directors were asked whether they believed that certain figures should be disclosed. The majority of respondents were hostile to the disclosure of directors' emoluments, both individual and total. However, sales turnover, which is often considered one of the figures most useful to competitors, was the figure which attracted most support for its disclosure, despite the dispensation from disclosure granted in the Companies Act, 1967 in respect of turnover not exceeding £250,000 (for the period covered by the survey).

In particular a higher proportion of respondents (53%) was against the disclosure of the value of stock than was against the disclosure of the turnover figure.

Accounting Services and Audit

The analysis of the survey to this point has covered the disclosure and use of information but as stated earlier the majority of comment surrounding the Green Paper proposals was concerned with whether small companies needed an audit. Most of this comment came from within the accounting profession. The survey provided an opportunity to collect directors' opinions. Respondents were overall satisfied with the services provided to them by their professional accountants, 80% of respondents to a direct question answering in the affirmative (Question 13). This suggests that there is available within the profession a high proportion of accountants providing services which directors find satisfactory.

In terms of the services provided by the accountant on the basis of a weighted scoring (4 for a first rank and so on) tax advice was seen as the most important service provided by the accountant but on the basis of 'first ranks' preparation of the accounts was the most important service. Auditing was ranked second and third on a 'first ranks' and score basis respectively.

As a generalisation it would seem that the three traditional services of accountants are accorded roughly equal weight and are very much more highly regarded than other services, such as general financial advice. In particular the value placed on auditing is borne out by replies to a hypothetical

question offering alternatives in the case that company audits were no longer compulsory. Only 7% of respondents would choose not to employ a professional accountant and a further 8% would dispense with the audit, but by implication, retain an accountant's services.

Cross-Correlation of Answers

Cross analysis of answers in the form of contingency tables provides some assurance of the consistency of the marginal results reported. In particular the following hypothesis can be supported at a significance of better than 5% on a chi-square test (although there were a few cases of low-cell frequencies).

- H₁: Respondents who saw the need for an audit as the main disadvantage of the corporate form were less inclined to retain the audit.
- H₂: Respondents who thought accounts were useful to shareholders tended not to think accounts were a waste of time and money.
- H₃: Respondents who thought accounts were useful to the public tended not to think accounts were a waste of time and money.
- H₄: Respondents who thought accounts were useful to shareholders were more inclined to think that accounts were not intrusive into owners' private affairs.
- H₅: Respondents who did not think accounts were useful to shareholders tended to think small companies should disclose less information.
- H₆: Respondents who thought accounts were intrusive into owners' private affairs tended to think small companies should disclose less information.

Summary and conclusions

The Companies Act 1981 still compels all companies, regardless of size, to produce full audited accounts, but small companies are not required to disclose for public inspection more than a simplified balance sheet and some Notes. From the finding that small company shares are normally controlled by the directors of the company and from the responses of directors, reporting to shareholders does not seem to deserve a high priority for anything but a very small proportion of small companies.

Based upon the responses of directors the main users of company accounts are the directors themselves (as managers), the tax authorities and loan creditors. But based upon the analysis of financial information disclosed by the companies it is difficult to reject the argument that business contacts need some means of evaluating the stability of small companies. There is some evidence that

publicly available information is so used, as it is intended to be.

It is sometimes suggested that limited liability is no longer a reality for many small companies and that if companies were unlimited, there would be no need for disclosure, by analogy with proprietorships and the existing position for unlimited companies. But the responses of directors show that most of them value limitation of liability highly, as compared with other advantages of the limited company.

The use of small companies' accounts as management information was beyond the scope of this project. As users of externally reported information directors rated assessment of profitability and 'net profit' as the most important uses and information. Because the 1981 Act does not require a small company to disclose more than 'profit retained' about periodic profitability, assessments of profitability by external users may well be impaired.

A majority of directors perceived their main competitors to be larger businesses, but few respondents could identify instances where disclosure had been actively harmful to the company. A bare majority of directors wanted less disclosure. Disclosure of directors' emoluments figures was the most unpopular disclosure requirement. Surprisingly, given past exemptions from disclosure, the turnover of the company was the figure which most respondents thought should be disclosed among the figures offered.

Respondents were broadly satisfied with the services they received from their professional accountants and ranked auditing only a little less highly than accounting and taxation services. Most of the respondents would wish to retain an audit for their company even if this were not compulsory.

Is it possible to interpret the above results in a consistent manner in order to provide possible policy prescriptions worthy of further research? Firstly, the management information needs of small companies seem to require further investigation. Are directors using financial accounts only to calculate the tax bill or are they relying on the accounts to tell them about the profitability, even the solvency, of the business? If so, should the accounting profession formulate recommendations about appropriate internal systems? Secondly, the question of easing the 'burden of reporting' should be re-examined because the Act may have produced a net disbenefit. It requires production and audit of full accounts and gives exemptions which do not seem to be valued very highly by those who benefit, but the exemption from filing may severely impair the usefulness of the disclosed accounts. The value of the exemptions could be increased by eliminating the requirements to produce full accounts for shareholders. But can shareholders be

permitted to dispense with their right to receive accounts? Alternatively or in addition, if all shareholders happen to be directors, can the requirement for full accounts in the present fashion be waived? Lastly, given that most small companies

would retain an audit, the benefit of making the audit voluntary seems limited, but can the audit be made cheaper and/or more appropriate to the small company's needs?

Appendix I

Comparison of balance sheet structure of sample companies and the results of Jones (1979)

	<i>Percent of total assets</i>		
	<i>Small and Intermediate Companies</i>		<i>Large Companies</i>
	Sample	Jones 1979	Jones 1979
Fixed assets:			
Tangible fixed assets, net	29.8	31.1	36.2
Goodwill/Intangible assets	—	0.7	3.2
Investment in unconsolidated subsidiaries/Trade investments	2.4	0.8	0.3
Total fixed assets, net	<u>32.2</u>	<u>32.7</u>	<u>39.7</u>
Current assets:			
Stocks and work in progress	28.0	27.8	27.5
Trade and other debtors etc	28.9	30.9	23.3
Investments/Other current assets	3.9	1.6	4.5
Cash and short-term deposits	7.0	7.1	5.0
Total current assets and investments	<u>67.8</u>	<u>67.3</u>	<u>60.3</u>
Total fixed and current assets	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
Current liabilities:			
Bank overdrafts and loans	13.7	12.4	9.7
Short-term loans	7.4	2.1	3.0
Trade and other creditors	37.3	31.9	25.2
Dividends and interest due	0.3	0.7	1.0
Current taxation	1.6	3.1	2.3
Total current liabilities	<u>60.3</u>	<u>50.3</u>	<u>41.1</u>
Net current assets	<u>7.5</u>	<u>17.1</u>	<u>19.2</u>
Total net assets	<u>39.7</u>	<u>49.7</u>	<u>58.9</u>
Capital and reserves:			
Shareholders' interest:			
Ordinary shares	6.9	8.3	11.6
Preference, etc. shares	0.1	0.5	0.7
Capital and revenue reserves	17.3	24.4	26.8
Total shareholders' interest	<u>24.3</u>	<u>33.3</u>	<u>39.1</u>
Loans from directors (including short-term)	7.4	5.3	—
Other long-term loans	3.4	5.0	10.3
Deferred taxation	4.6	6.0	7.4
Minority interests in subsidiaries	—	0.1	2.1
Total capital and reserves	<u>39.7</u>	<u>49.7</u>	<u>58.9</u>
Total capital and liabilities	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

Source: Jones (1979) and author's sample

Appendix II

Survey: Questionnaire and Responses

1. (2) *What is the main advantage of running your business as a company rather than as a partnership or as an individual?

*see Notes at end.

%	
46	Limitation of liability
16	Tax saving
12	Ability to raise finance
11	Ease of transfer of ownership
6	Sets out rights and duties of owners and managers
5	Other
4	Not answered
<u>100</u>	

2. (8) What is the main disadvantage of running your business as a company?

%	
44	Government form filling
21	Disclosure of financial information
12	Need for an audit
10	Tax problems
5	Other
8	Not answered
<u>100</u>	

3. (3) Please rate in order of importance the uses of your company's annual accounts

%		
First Ranks	Score*	
41	555	Providing management information to yourself and directors
26	522	Supporting tax computations
17	452	Providing information to bank (or other providers of finance)
7	297	Reporting state of affairs to shareholders
1	165	Providing information to trade creditors
1	9	Other
7	—	Not answered
<u>100</u>		

4. (4) How do you assess the credit worthiness of a new business contact? (more than one choice was permissible)

%	
67	Personal contacts
47	Bank reference
43	Trade references
12	Credit reference agency
9	Ask to see accounts
5	Other
6	Not answered

5. (12) How many times in the last year have you had cause to 'search' either directly, or through advisers, the publicly filed information about a business contact company?

	%
Nil	72
1	8
2	3
3-6	8
more than 6	5
Not answered	4
	<u>100</u>

*see Notes at end.



6. (5) Which of the following financial aspects of other companies are you able to realistically assess from the present type of company annual financial report?

% of those reading other
companies' reports

67	Profitability
27	Potential bankruptcy
28	Capacity to survive
36	Managerial efficiency
6	Investment policy
15	None of the above
—	Do not read other companies' reports

7. (16) Please rank in order of importance for business decisions, the following information contained in the accounts of other private companies.

First Ranks Score

%		
30	631	Net profit
20	549	Net current assets
11	460	Total assets
9	410	Turnover (Sales)
9	281	Auditors' report
6	309	Source and application of funds
15	—	Not answered
<u>100</u>		

8. (15) If, personally, you own shares in one or more publicly quoted companies, do you find their accounts useful in making investment decisions?

%	% of respondents having investment in quoted companies	
25	56	Yes
20	44	No
55	—	No investment in quoted companies
<u>100</u>	<u>100</u>	

9. (6) Who are your company's main competitors?

%	
32	Small local businesses
21	Large local businesses
26	Large national businesses
15	Other
6	Not answered
<u>100</u>	

10. (10) To your knowledge has any competitor ever used the publicly filed information concerning your company to your company's disadvantage?

%	
10	Yes
88	No
2	Not answered
<u>100</u>	

If 'yes' please give brief details

11. (13) In general do you feel small limited companies should disclose

%	
52	Less information
43	About the same amount of information as at present
4	More information
1	Not answered
<u>100</u>	

12. (9) Do you believe the following figures should be publicly disclosed in small company accounts?

Yes %	No %	Not answered %	
49	44	7	Turnover (Sales)
48	47	5	Net profit before tax
38	53	9	Value of stock
26	68	6	Total directors' emoluments
15	75	10	Approximate individual directors' emoluments

13. (17) Are you satisfied with service you receive from your professional accountant?

%	
80	Yes
16	No
4	Not answered
<u>100</u>	

If 'No' please indicate reasons

14. (7) Please rate in order of importance the services provided to your company by its professional accountant:

First Ranks	Score	
35	415	Preparation of the accounts
25	424	Tax advice
27	380	Audit of the accounts
6	241	Other financial advice
1	6	Other
6	—	Not answered or omitted
<u>100</u>		

15. (14) If the requirement to have an annual audit of your company's accounts was removed would you:

%	
9	Continue to have an audit (as opposed to professional accounting services) principally for the shareholders
17	Continue to have an audit for external users of the accounts (e.g. the bank)
58	Continue to have an audit for the efficient running of the company
84	
8	Choose not to have an audit
7	Choose not to employ a professional accountant at all
1	Not answered
<u>100</u>	

16. (11) On the whole, are accounts for the private company:
(more than one choice was permitted)

%	
50	Useful to shareholders
9	Useful to the public
23	A waste of time and money
22	Intrusive into the owner's private affairs
12	None of these
2	Not answered

17. (18) *Personal Details*

Age: under 30 3%; 30-45 34%; 45-60 39%; over 60 20%; not answered 4%
Which is your main area of expertise?

%	
27	Technical (e.g. engineering, manufacturing)
11	Professional (e.g. law, architecture)
26	Commercial (e.g. buying and selling)
8	Financial
21	Managerial
4	Other
3	Not answered
<u>100</u>	

Does your work with the company constitute your main business activity?

%	
84	Yes
13	No
3	Not answered
<u>100</u>	

What level of accounting experience do you have?
(Please tick one)

%	
5	Accountancy qualification (please state which)
17	Financial management
6	Courses in accounting
27	Book-keeping experience
44	Little or none
1	Not answered
<u>100</u>	

Notes

1. Score basis

Where respondents were asked to rank n items in order of importance a weighted score for each item was calculated by allotting n points for most important, $n-1$ for second most important and so on. Equal rankings were settled by random allocation and unranked items were accorded zero points. Scores have no absolute meaning but provide a means of aggregating respondents' ranking of items.

2. The questions have been reordered into the order in which they were discussed. Original question numbers are stated in brackets.

The original question 1 ascertained that respondents were directors and is omitted. Line ordering within questions has been changed to give, generally, the most frequent response first. Copies of the original questionnaire may be obtained from the author.

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Book Reviews

Profit Forecasts: How They Are Made, Reviewed and Used. C. A. Westwick (editor). Gower Press, 1983. xiv + 248 pp. £19.50.

The stated objective of this collection of essays is to show how profit forecasts are prepared in today's business world, how they are made public and how they are used.

The first five chapters are written by leading industrialists about forecasting in their particular industry. For example, Jeff Percy, former deputy chief accountant at ICI, is the author of the chapter on the chemical industry. The essays are in the nature of general observations about the problems of forecasting: the choice of the time horizon over which a forecast is made, the critical firm-specific and macroeconomic variables, and the frequency of updating. Despite the stated objectives in the preface, these chapters give very little insight into how forecasts are constructed; references to econometrics and macroeconomic models are sparse. Of course, within the constraints of a single chapter, any serious econometric work (such as whether or not management forecasts or a random walk model can outperform a firm-specific Box-Jenkins model) is difficult to achieve. Given this constraint, the problem probably lies with the planning of the book, rather than with any particular contributor.

The second part of the book is concerned with the rôle of the reporting accountant, the merchant bank, the Stock Exchange and the City Panel when a forecast is published in the UK. These chapters are clearly written and improved the reviewer's education a great deal. Particularly instructive are the chapters on the accountant's responsibility (by A. V. Ashton, a Deloitte, Haskins and Sells partner) and that of the merchant bank (by R. W. Heley, a Hill Samuel director).

In the third section, the chapter by P. M. D. Gibbs and W. T. Seward is a discussion about P/E ratios and the use of industry and firm-specific statistics in providing estimates of earnings.

The section also contains a chapter by the editor on the accuracy of forecasts. The chapter is useful in that reference is made to many (if not all) of the important research papers in the area; the summary is disaggregated by topic (for example, forecasts produced by analysts, forecasts produced from statistical models). Despite the careful presentation, the chapter is rather like a catalogue, and the reader is not given any of Chris Westwick's insights into the role of profit forecasts in an

information market. Firstly, there is little sense of policy perspective. For example, should managers be required to make forecasts? Should managers be precluded from disclosing forecasts, on the grounds that the task can be undertaken more effectively by analysts? It would have been better if the 26 technical conclusions of the chapter had been moulded into some policy implications.

Secondly (despite the 26 conclusions being of a technical nature), on the technical front, the reader is completely abandoned. In an appendix to the chapter (written by R. Cantelow, a colleague of the editor at Arthur Andersen), there is a list of statistical reservations about each of the 26 technical conclusions in the main chapter. If taken literally, these reservations invalidate many (if not all) of the conclusions in the editor's chapter. The reader is left totally confused as to what Chris Westwick believes to be the contribution of the research effort which he describes so effectively.

The final section of the book is concerned with profit forecasts in the USA, in Canada and in the EEC. These provide a useful background to the UK discussion. For example, the accounting research director of The Canadian Institute of Chartered Accountants states that the inclusion of earnings forecasts in prospectuses has been discouraged by the Canadian securities commissions. She also remarks that the practice in Canada has been not to provide earnings forecasts, even in a narrative form, in takeover documents.

In summary, the book provides some well written and concise material on the institutional side, both in the UK and abroad. On the analytical front, the book does not live up to its title; the interested reader is probably better off with George Foster's *Financial Statement Analysis* (Prentice-Hall 1978), chapters 4 and 5.

University of Durham

Len Skerratt

Geschichte betriebswirtschaftlicher Theorie. Dieter Schneider. Oldenbourg, 1981. 477 pp. DM 54.

The history of business economics theory comes from the pen of a Bochum professor widely known for his works on 'economic values' for accounts and on the impact of fiscal law and decisions. This book includes material previously exposed and found disputable in journals; the whole now professedly represents a third year 'core' course which would seem both daunting and stimulating to any

German student and thoroughly worth attention by the interested reader abroad.

The terms chosen for the title may be explained in inverse order. 'Theory' is not chosen because practice is ignored: indeed actual practice through the centuries is often contrasted with 'doctrine', and shown to lead or lag as against theory. But the erudition of the author shows itself particularly in his knowledge of centuries of doctrine represented by text books, some of which are known only in Germany but most of which are referred to in any history of economics.

The strength and difficulty of the book may be found in its theorising and methodology. The characteristics of a business economics theory are found in that they relate to reality, are empirically testable and capable of solving problems. Theories can be constructed on the hypotheses of rational action (*vernünftigen Gestalten*) or of the 'separability of mutual inter-dependencies from market pricing'. This last linefull is derived from equilibrium economics, and permits analyses of prices regardless of quantities, or of inputs regardless, for limited purposes, of outputs. Each hypothesis is generalised to justify specific methodologies. In a final section, Schneider returns to methodology, to model-building and testing with reference to wide ranging authors from Wittgenstein down! In Schneider's words, 'the whole problem between theory and reality collapses on the question of translation or transfer from one language into another'. He tries to write theory and history simultaneously.

'Business Economics' is here used in the German sense, covering the applied social and administrative sciences which were taught to 24,000 German students in 1980 (compared with the 22,500 who studied a more General Economics, or the 12,000 who studied Political Economics). In that year there were 482 Business Economics professors in all, most having some specialism within or round the core subjects. The title 'Business Economics' (*Betriebswirtschaftslehre*) was adopted in the Cologne Commercial College in 1919. The previous and subsequent history of the discipline is documented. But Schneider's pursuit of the ancestry of current theories ignores national boundaries: Modigliani and Miller and CAPM, for example, are summarised in total disregard of problems in the transfer of ideas. Moreover the impact of specifically German theories abroad is nowhere assessed. Until the Second World War, we are told, British and American theory was comparatively 'in nappies'. Since the war, Business Economics is said to have flourished on imported material—a tendency which it is Schneider's purpose to reverse!

The book adopts a double approach in separate sections which describe overall developments sequentially and also those in specific areas (or 'Theories'). Early relations of economics and

book-keeping are reviewed, with corroboration for Yamey's doubts whether account books really helped rationality. Profit maximising is attributed to the 18th century (not to the 'imperfect competition' of 20th century economists!); entrepreneurs seldom kept good books, which were prescribed for banks etc; and 'capital' assets were usually excluded from the books. Schneider concludes importantly that decision and control information originated not in traders' double-entry, but in the budget and actuals of Cameralism.

Non-German accounting historians know little of Cameralist developments, in which state and estate accounts are necessarily modified so that dues and receipts, obligations and expenditures are related. Schneider overstates the case for planning and control and belittles the adaptationist (marginal cost = marginal revenues to maximise individual and social welfare) views of Schmalenbach from 1919. Three years later, McKinsey was to launch 'Business Budgets' in the Middle West, ignorant that Fredersdorff in 1802 had defined and detailed budgeting procedures for an iron-works. Here the theorist as well as the historian has much to learn.

Developments to 1945 are often tendentiously described by Schneider, with his emphasis on a 1912 dispute between social scientists and little sensitive appreciation of the relation of theory and pragmatism in Business Economics. The post-war period is analysed methodologically; Gutenberg and Heinen are discussed largely under specific aspects, especially costs.

Planning and organisation; utility and decisions; price-theory and marketing; production and costs; investment and finance—all these are given treatments sometimes analogous to those by Parker in his book *Management Accounting*. Specialists in each area may well look here for background material complementary to that available in English. Cost accounting (as distinct from cost theory) is covered in twenty pages.

It is the final section on Accounting and Reporting which deserves particular attention. Only slowly were the aims of external reporting clarified, and secret reserves finally laid to rest. Schneider denies that there is a useful distinction between 'static' (position) information and 'dynamic' profit measurements. The novelty of period profit measurement he illustrates from partnership deeds permitting withdrawals and crediting interest on capital, but calculating and dividing profit only on wind-up. Accounting principles, he argues, never developed pragmatically but only from fiscal law and cases. Leffson's efforts to clarify their bases deductively are described in one sentence. Nominal capital maintenance earns Schneider's scorn, since the maintenance of real capital was already accepted in Roman law.

This book thus offers an extremely well-

informed and intelligent but disputatious coverage of material in large part not available to the reader of English only. Its imperfections may be found concentrated in the final section on 'First lessons from the history of a discipline' which attempts to discern progress or failure in income theory, to describe the scope for hypotheses or laws in micro-economic theory, and to emphasise the role of empiricism in theory-building. The role of the individual theorist is belittled: each is accorded a 'thumb-nail' biographical sketch in place of the extended treatments of individuals and schools which make Schumpeter's *History of Economic Analysis* so readable. Schneider thus reveals himself as a powerful theorist eager to find support for his views in history rather than as a humble interpreter of a great tradition.

University of
Strathclyde

D. A. R. Forrester

Accounting for Management Decisions. *John Arnold and Tony Hope.* Prentice-Hall International, 1983. xiv + 386 pp. £8.95 paperback.

As the publisher's blurb on the back cover proclaims: 'first and second year accounting students at the University of Manchester have taught John Arnold and Tony Hope the basic principles of management accounting over the last 10 years. This book is the result.' It is a text for a course of twenty lectures on introductory management accounting, and also includes some material on basic finance and financial mathematics. The book is in two major parts: the first outlines a basic framework for analysis which is intended to set management accounting in its wider context; the second and larger part deals with applications to specific topic areas. Each chapter concludes with a useful set of discussion topics and suggestions for further reading and most have a good number of numerical exercises.

Both the strength and weakness of this text is that it does exactly what the title would lead you to expect. It is a decision-oriented approach to management accounting that concentrates upon economic analysis with little consideration being given to the other functions served by management accounting information such as management control and the evaluation of performance. This emphasis is made quite clear in the initial chapter where it is stated that 'management accounting is concerned with the provision of information to managers who make decisions about the ways in which an organisation's resources should be allocated' and also that the organisational objective to be assumed is 'the maximisation of the present value of the organisation's future cash flows.' The result is a somewhat unhappy combination of

well-presented technical material set in an artificially restricted organisational context.

The basic framework presented covers a variety of material, yet fails to give a well-rounded view of the roles played by management accounting in organisations. After the obligatory overview of the subject to set the scene, a rather odd chapter on scientific method is inserted. This totally confuses accounting practice with accounting research and glosses over the important distinctions which exist between the natural and social sciences. There then follow chapters on information theory and theories of decision-making, elementary financial mathematics, probability analysis and portfolio theory, and on the measurement of costs and benefits. These have a strong economic orientation and neglect most of the human, behavioural and organisational aspects of the subject. I am not convinced of the value of much of this framework as an introduction to the applications covered; some of it is an essential prerequisite for the topics to follow but much is a vague discussion of issues that may not be appreciated until the applications are presented. Further, much of the material is very similar to that in Arnold, Carsberg and Scapens' *Topics in Management Accounting* (Phillip Allan, 1980).

By contrast, the applications section of the book is logically argued and excellently presented. The usual range of introductory management accounting material is presented with chapters on cost behaviour and analysis, pricing policy, short- and long-term decisions, a linear programming treatment of constraints and opportunity costs, NPV and IRR evaluations, and a discussion of the cost of capital together with concluding chapters on budgeting, variance analysis and divisional performance measurement. I would recommend the book for these chapters alone with the sole reservation that the material on budgeting is presented in a limited and unexciting manner (inevitably, some would say, but I disagree), but this is a consequence of the original decision-making orientation. I am also unhappy with the explanation of variance analysis where it is not emphasised that the method shown is valid only where production and sales are exactly balanced. As a basis for more advanced teaching I think that there is much to be said for using a standard cost approach at this introductory level.

My final reservation concerns the range of material covered. Although the contents are no doubt well-matched to the pattern of teaching followed at Manchester, they may prove difficult to integrate into other course designs. The material is too extensive for most first-year courses particularly if it is wished to supplement it with teaching on the institutional aspects of finance, yet it provides only a limited coverage for a second-year course. Nevertheless, many of these criticisms are mere quibbles

and could be made only of a book having a very high standard of explanation and presentation. Within its defined domain it is a model of clarity and should be on the bookshelf of every management accounting teacher. Equally no student could fail to benefit from its study. Nevertheless I do not think that it should be the sole exposure to management accounting received by first and second year students; some wider coverage of the multiple roles played by management accounting information in organisations is also of vital importance.

University of Lancaster

David Otle

Financial Econometrics for Researchers in Finance and Accounting. *H. Russell Fogler and Sundaram Ganapathy.* Prentice-Hall International, 1982. xii + 212 pp. £12.70.

Over the past twenty years or so, those interested in the empirical 'facts' of financial markets have been confronted with a literature of ever growing complexity and size. High standards of statistical/econometric methodology are imposed on authors by finance journals and some familiarity with econometric methods usually to the standard, say, of Johnston (1972) assumed on the part of readers. The ambitious aims of this volume are firstly to introduce the uninitiated reader to econometric methodology and secondly to review some of the major topics in empirical financial research. It does not achieve these aims with equal success.

As an econometrics primer for 'non-quantitative' finance students, the text contains a great deal of algebra. Almost half the book is given over entirely to technical appendices dealing with probability distributions, matrix algebra and selected proofs of basic econometric propositions. The rest of the book also reproduces many formulae, sometimes with heuristic justification, and requires familiarity with matrix manipulations to follow its arguments. In addition this section of the book is rather loosely written. Thus we find: 'estimation of a statistic' (p. viii), 'error terms are independent of the explanatory variable, i.e. $E(R_{m,t}, U_t) = 0$ ' (p. 29). The latter condition is not sufficient for the first nor for BLUE estimation with stochastic regressions. 'In such situations the data matrix X has linearly dependent columns and hence... $|X|$ is zero' (p. 60). Since X , the data matrix, is invariably not square $|X|$ is always zero.

A large amount of ground is covered by the book including the basic linear model together with problems of heteroscedasticity, autocorrelation, seemingly unrelated regressions and measurement errors, the use of dummy variables and extensions to simultaneous and recursive systems.

The book is more successful in its use of financial material as examples to interest the financial ana-

lyst. The reader is introduced (albeit briefly) to studies of the effectiveness of the CAPM, other determinants of share price movements, the impact of interest rates and of dividends on stock prices. These studies are generally significant and of intrinsic interest and should serve to motivate non-quantitative students to follow the purely econometric sections.

In conclusion those requiring a readable introduction to econometrics might well consult one of many other excellent texts available (e.g. Pindyck & Rubinfeld, 1981; Maddala, 1979). This text is particularly useful for those (with some algebraic competence) who wish to gain a flavour of modern quantitative financial research. The book is rare in providing econometrics (*per se*) and finance under the same cover.

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University of Exeter

John Matatko

Modern Portfolio Theory and Financial Institutions. *D. Corner and D. G. Mayes (eds.).* Macmillan, 1983. xiii + 253 pp. £25.

This book consists of a collection of ten papers given by a group of practitioners and academics at a symposium held at the University of Exeter on Modern Portfolio Theory (MPT), defined on page 177 as 'A generic term including the Market Model, the Capital Asset Pricing Model, and the Efficient Markets Hypotheses'. Although the book claims to give a non-technical outline of Modern Portfolio Theory (the symposium itself probably achieved that objective) it must not be judged as a textbook, and indeed it would compare unfavourably with the many standard textbooks written specifically for the purpose. Rather, the book has to be judged with respect to two of its goals:

- (a) the extent to which it demonstrates the usefulness of MPT as a tool for investment managers seeking to outperform the market, and
- (b) the extent to which it directs the reader towards the potential for CAPM etc to be extended to assets and institutions not normally associated with the model.

With respect to the first goal the book is disappointing. It would have seemed appropriate, and would certainly have fulfilled a great need, if at least one chapter had presented a reasoned case for believing that pension funds, investment trusts, and other managed funds are justified in incurring

the costs of pursuing active investment strategies designed to outperform the market, in the light of the evidence that most consistently fail to do so. But only a few arguments scattered throughout the book are presented. One contributor is content with asserting simply that 'in the practical world markets are not efficient' (page 172). Another maintains that the evidence indicating consistent underperformance of the market by the majority of managed funds is not to be attributed to bad judgement or to market efficiency, but to "slippage" between the manager's judgement and its implementation in the portfolio.'

Other contributors (chapter 4, 'Portfolio Theory and the Management of Investment Trust Companies') clearly have doubts about the usefulness of active investment strategies in relation to the more frequently traded assets, and offer a strategy based on the premise that thinly trading assets are inefficiently priced. Their evidence for that hypothesis, however, is itself somewhat thin.

It is with respect to the second aspect, the applicability of MPT to special situations and to other categories of assets, that the book makes its contribution. In particular, Chapter 7 addresses the interesting question as to the relevance of CAPM etc. to property investments. Other chapters consider 'The Role of Traded Options in Portfolio Management', 'The Implications of MPT for Life Assurance Companies', 'The Consequences of The Removal of Exchange Controls', and 'The Contrast between Portfolio Theory and Econometric Models of the UK Monetary Sector'. It is these chapters that give the book its distinctive character and make it a book to be commended to specialists in the field.

In summary, this is not a textbook on MPT. Nor, regrettably, does it contain a well reasoned attempt to show why investment institutions should continue to commit themselves to an active investment strategy. The book is rather a series of individual views of ways in which MPT might have wider relevance than conventionally assumed, including its potential use as a tool to outperform the market. Given the price, it is likely to be more of interest to practitioners than to students, although it deserves to be included in the reference library.

University of Glasgow

Simon M. Keane

Treasury Management in the UK. *Edward Davis and Paul Collier.* The Association of Corporate Treasurers, 1983. 30 pp. £5.

The phrase 'treasury management' evokes in me a mental picture of the gnomes of Whitehall attempting macroeconomic policy-making or coming down heavily on the spending departments of government. This may serve to show how little the Association of Corporate Treasurers has hitherto

succeeded in impressing on my consciousness the existence of a separately identifiable treasury function in companies. This state of affairs will be partially remedied by this study which was commissioned by the Association in 1981 'to crystallise the facts as they then stood about the nature of the development and responsibilities of the treasury function'.

A major difficulty is that this infant profession has as yet no fixed point on which to base investigations. The 700 members of the Association (in 1981) were not necessarily called 'Treasurers', did not necessarily work in companies with treasury departments, carried out a variety of functions with more or less power to act without reference to a higher authority, and were not by any means the only people in British industry carrying out any of these functions.

The study acknowledges that the significance of its findings is constrained by its mode of operation. The centrepiece of the research was a postal questionnaire addressed to members of the Association of Corporate Treasurers (ACT) but seeking information about the treasury function in the groups of companies in which they worked. A 49% response rate yielded 113 usable replies—all of course relating to groups in which ACT members work.

It was assumed that banking, investment of surplus cash, borrowing and currency management are the four core areas of the treasury function. No evidence contrary to this assumption was produced by the questionnaire or the 30 follow-up visits to companies. The overwhelming majority of groups in the sample had some degree of centralisation of these functions. Of the 64 companies with a treasury department, the treasurer had functional responsibility for these four functions in the overwhelming majority of cases. Where long-term borrowing and parent company guarantees or security were concerned, most treasurers required the approval of a committee or a superior for their decisions; but in other areas they usually had discretionary powers, sometimes up to limited levels.

Other interesting findings include: (1) treasury departments are mostly very small (less than 6 personnel in total) and young (89% formed since 1970); (2) currency management tends to be less often centralised within groups than the other treasury functions—despite being one which demands a very particular and scarce expertise; (3) 75% of the treasurers come from an accountancy background.

This is an interesting glimpse into an emerging profession. But I am left wondering whether its independence from the accountancy profession is necessary or wise.

University of Kent at Canterbury

Peter Bird

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There is a submission fee of £18 (US\$30) for non-subscribers to *Accounting and Business Research*.

Guide for Authors

Accounting and Business Research seeks to publish papers which make substantial and original contributions to important areas of research. Papers should be comprehensible and interesting to at least a major section of our readership, and should be as brief as possible, consistent with the above aims.

General

Manuscripts should be typed and double-spaced. *Three* copies should be submitted together with, in the case of non-subscribers only, a submission fee of £18 or US\$30. In order to assure an anonymous review, authors should not identify themselves directly or indirectly.

Presentation

A cover page should show the title of the paper, the author's name, title and affiliation, and any acknowledgements. The title of the paper, but not the author's name, should appear on the first page of the text.

Tables and figures

Each table and figure should bear a number and a title and should be referred to in the text. Sources should be clearly stated.

Footnotes

Footnotes should be used only to avoid interrupting the continuity of the text and should not be used to excess. They should be numbered consecutively throughout the manuscript with superscript arabic numerals. They should not be used in book reviews.

References

References should be listed at the end of the paper and referred to in the text, as, for example, (Zeff, 1980). Citations to institutional works should if possible employ acronyms or short titles. If an author's name is mentioned in the text it need not be repeated in the citation, e.g. 'Whittington (1982, p. 6) states ...'

In the list of references titles of journals should omit an initial 'The' but should not otherwise be abbreviated. The entries should be arranged in alphabetical order by surname of the first author. Multiple works by the same author should be listed in chronological order of publication. Some examples are:

Accounting Standards Steering Committee (1975), *The Corporate Report* (1975)

Edey, H. C. and B. S. Yarney (eds.) (1974), *Debits, Credits, Finance and Profits* (London: Sweet & Maxwell, 1974)

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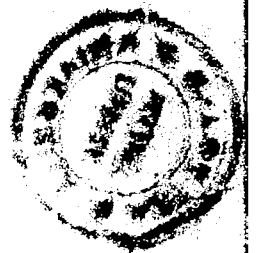
Style and spelling

Abbreviations should be written as, for example, FASB and not F.A.S.B. Words such as 'realise' should be spelt with an 's' not a 'z'. Single quotation marks should be used, not double.

Mathematical notation

Mathematical notation should be used only where its rigour and precision are indispensable, and authors should explain in narrative format the principal operations performed. Such notation should be avoided in footnotes. Equations should be numbered in parentheses, flush with the right-hand margin.

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Forthcoming Articles

Articles which have been accepted but not yet published include those listed below (in alphabetical order by author):

G. S. Archer and K. V. Peasnell, Current Cost of a Quoted Long-Term Liability. A Comment

R. K. Ashton, A Statistical Analysis of Decisions in Revenue Cases by the House of Lords.

Paul Barnes, The Effect of a Merger on the Share Price of the Attacker Revisited.

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Microcomputers, Financial Statement Analysis and the Data Needs of Financial Analysts

Michael Barron

Introduction

Over the last few years computers have transformed the way companies keep internal records and prepare accounts. With the advent of microcomputers this is true for even quite small companies. Nevertheless, the impact of computers on the way published accounts are used has been far less dramatic. Specialist analysts have, of course, used computers for years but neither the appropriate software nor computer readable data has been available to the general user. However, the situation is changing.

Microcomputers can now offer analysis tools with a combination of performance, flexibility and low cost which would be hard to match on a mainframe. In the USA several sources of company data with appropriate analysis software have been available to home computer enthusiasts for some time. In the UK a commercial microcomputer based analysis service has been offered by EXTEL for over a year. Datastream and Reuters have both announced microcomputer based services. Dun and Bradstreet offer the Key British Enterprises data in micro readable form and a number of small companies offer specialist microcomputer based analysis services.

If this trend continues, as it seems certain to do, the special needs of computerised analysts will soon have to be explicitly considered when accounting standards are set. It may seem that whether an analyst uses a calculator or a computer would have very little effect on his data needs. However this paper will argue the contrary view: that the computer assisted analyst does have rather different needs from the manual analyst. In particular he (or she) may be vulnerable to misinterpreting or completely overlooking some of the published accounting numbers.

The primary reason for accounting policy bodies to give explicit consideration to the computerised analyst is to stop this vulnerability leading to abuses in financial reporting. However, there is another consideration. The wider use of micro-

computers is going to mean that extremely powerful analysis techniques will be available not just to a few specialists but to virtually everybody who uses accounts. Published data is going to be probed more deeply than ever before; new questions are likely to be raised and new disclosures requested. Thus it may be the accounting profession as well as the analysts who become more vulnerable.

Broadly speaking there are two main differences between computerised and manual analysis. The first is to do with storage and handling of data, and the second with the range of analysis techniques that are available. This paper will consider some propositions relating to each. Then, in a final section, it will bring together the policy implications.

The storage and retrieval of accounting data in a computerised analysis system

Proposition 1

The financial analysis database used by a microcomputer would need to be much more restricted than one for a manual system

Although computers have enormous data handling capabilities, those of a human analyst are in some respects even greater. A typical set of accounts for a public company contains about 40,000 to 50,000 characters of information. Thus ten years' accounts for two thousand companies could amount to 1,000 million characters. This excludes the photographs, the press cuttings, brokers' reports and other background information which probably require about a third as much storage again.

A mainframe computer could store this much data but it would be an expensive solution and not necessarily more convenient than conventional paper storage. However, the task is way beyond the capability of a microcomputer using present day technology. An IBM PC floppy disc, for example, can store less than a third of a million

characters. A hard disc, such as the IBM XT uses, can store ten million characters and even large microcomputer hard discs rarely hold more than thirty to forty million characters. Thus any microcomputer accounting data base must probably aim to hold less than 5% of currently stored information.

Most analysts would agree that a certain amount of the information supplied in accounts is redundant either because it is not used or because it could be recreated if necessary. However it has been estimated that the raw data to create all EXTEL's accounting services, which probably contain little redundant information, would require at least 100 million characters.¹ Thus it appears that a substantial amount of relevant as well as irrelevant information would have to be omitted from a microcomputer based analysis system. The information would still be available from conventional sources but an important question still arises as to which information should be included in the computer system and which stored in the traditional way.

In theory, data should be stored so long as the marginal benefit of so doing exceeds the marginal cost. Unfortunately, in practice, it is not easy to measure either the marginal cost or the marginal benefit. Nevertheless, some indirect evidence is available by considering the economics of computer data bases.

The key point is that handling well structured data on a computer is much more cost effective than handling poorly structured data. It is also more cost effective to handle numeric data rather than textual data. The explanation is partly technical and to do with storage and data handling, but it is mainly because one can do so much more with well structured numeric data than one can with unstructured textual data. The analysis processes are easier to specify and once specified they generally contribute far more to interpreting the data.

The data used in financial analysis is of both types. The statutory accounts and some of the background information is completely numeric and reasonably well structured. The rest, and in volume terms the greater part, is poorly structured and mostly textual. Since it is with this data that the computer's contribution is likely to be least and the cost highest, it makes sense to ignore it and concentrate on the structured numeric data.

It would be absurd to suggest that only well structured numeric data is relevant in a company's analysis. However it is almost certainly the most cost effective area in which microcomputers can contribute to the broader analysis task. It is also in

this area that accounting policy considerations are most relevant. Nevertheless, impressive progress is being made with programs that can interpret natural language and mass data storage is getting cheaper all the time. Hence within a few years the position may be completely changed.

Once the textual data has been eliminated the data task becomes far more manageable. MicroEXSTAT for example stores six years' data for about 2000 companies using under four million characters.²

Proposition 2

The data base for a computerised financial analysis system would need to use an even more rigid data structure than is typically used in published annual reports or in most manual analysis systems

The most effective way to store accounting data in a data base is using fixed fields where each field always contains the same data item. For example, one field might be used to store the value of Raw Material Stock and it would never be used to store any other data item. The great advantage of fixed fields is that the data is held on a consistent and comparable basis. Consequently it is easy to produce a wide variety of consistently defined reports. Statistical analysis, searches and other comparative studies can also be carried out on a consistent basis.

Fixed fields are not the only approach to storing data. The computer could alternatively be used, like a word processor, to store the data for each company in whatever way suited that company best. However, the benefits in comparison to a manual system would be very slight. Most ratios and probably even basic reports such as funds statements would still require a lot of individual effort from the analyst. Cross sectional and time series analysis would be difficult because much of the data would not be truly comparable. The computer would therefore help at a clerical level but would not make much contribution to the actual analysis.

The disadvantage of fixed fields is that they require the published data to be forced into a set of categories which may sometimes be inappropriate. This can arise if the data is presented using headings that were not anticipated when the fields were defined. Fortunately in the UK this problem is now somewhat reduced because of the more rigid presentation required by the 1981 Companies Act. Nevertheless it will still continue to some extent because companies are not completely homogeneous and because the 1981 Act tolerates some flexibility.

¹This estimate of the storage space that would be required for the data contained in the EXTEL accounting information services was made by the author. It is not in any way an official EXTEL opinion. However, an EXTEL director has agreed that it is 'probably in the right ball park.'

²MicroEXSTAT is an IBM PC based financial statement analysis service that was developed by the author and Jeremy Smithers (both of London Business School) in conjunction with EXTEL Statistical Services.

A slightly different problem arises when data is presented in a standard way but with notes explaining that it is in some way unusual. An example might be a UK company which values a significant part of its stock on a LIFO basis. In this situation the relevant figure will be entered into the best available computer field but the explanation may not be stored. Consequently subsequent users will have no way of telling that the figure is not strictly comparable with others in the same field.

In theory these problems could be solved by using a very large number of fixed fields and creating new ones to cope with every difficult situation. However, data processing and storage costs make this impractical. Furthermore, recent thinking in information theory suggests that aiming for finer and finer data is not necessarily a good idea.³ Thus in practice one has to settle for the largest feasible number of fixed fields which, once established, may be quite hard to change.

The exact number of fields to use will vary with the circumstances. For specific applications fewer data items will be needed than for general purpose analysis. However examination of existing systems suggests that between 75 and 100 fields are adequate for most general purpose analysis. It is possible to manage with less although 35 is probably the minimum. More fields make it easier to classify difficult items so if storage and processing costs are not too important as many as 350 fields can be used with benefit.⁴

When the exact use of the data is not known in advance the selection of the fixed field definitions is usually a matter of balancing fineness against comparability. In practice there is often a kind of 'common denominator' level of disclosure for which reasonably comparable data are available for all companies. This level will be determined by statute or accounting practice and, of course, it will vary a great deal between countries and even between different types of company.

If data are stored at this level, or in a more aggregated form, then comparable data will be available for most companies. However if data are stored at any finer level, some data items will not be available for all companies. It follows that such fine data would need to be aggregated to the 'common denominator' level before it could be used comparably. It will also be more convenient for software to work at this comparable level; otherwise reports may have to be specified individually for each company.

Since comparability is usually quite important in

a computer data base the 'common denominator' level of definition will frequently provide a good basis for the fixed fields. Unfortunately this level is not precise and some judgements will still be required as to the minimum number of companies that must provide some item of data before it is worth including in the data base.

Two examples may help to clarify the issues involved. Consider first the disclosure of Term Loans. The 1981 Companies Act and the Stock Exchange require all loans to be classified into one of sixteen categories. First they must be classified by maturity (under 1 year; 1–2 years; 2–5 years; over 5 years); then by whether secured or not and finally by whether convertible or not. Most companies comply with these requirements by providing full details of their major loans; Beecham PLC, for example, lists 18 distinct types. The question, therefore, is whether this level of detail needs to be stored or whether all loans could be aggregated into say four or five categories without too much loss of information.

The second example concerns the profit and loss account formats in the 1981 Companies Act. These require all companies to publish significantly finer detail than was previously required. Unfortunately the different formats require different disclosure so that the fineness of comparable data is hardly improved.

The disclosure requirements of the four alternative formats are summarised in Fig. 1. It can be seen that the difference between formats 1 and 3, as between 2 and 4, is mere layout. However, the difference between P & L formats 1 (or 3) and 2 (or 4) is real. In one case the operating expenses are classified by function (Cost of Sales, Distribution, etc) and in the other by type (Raw Materials, Depreciation, etc). There is no way that one can be converted to the other.

As a small but useful step towards comparability the depreciation is required to be footnoted under format 1. This at least allows Operating Expenses to be comparably sub-divided into Depreciation, and Other Expenses. However, no further comparable sub-division is possible.

Even though the 1981 Act data is not fully comparable across all companies it would be sensible to use a data structure that could store data from either format 1 or format 2. This is because comparable data will be available for a reasonable proportion of all companies and at the individual company level the additional data is certainly useful.

Proposition 3

Analysts will increasingly share pre-processed data which will have been extracted from the accounts by specialists and put into computer readable form

Even today this separation of data extraction from data analysis is quite common. Many profes-

³Hirshleifer (1971) provides the original explanation of why Blackwell's fineness theorem might not apply when market effects are taken into account. A more recent survey of the debate is contained in Verrecchia (1982).

⁴MicroEXSTAT uses 75 headings while EXSTAT uses 286. At the other end of the scale Barron (1980) describes an analysis system using only 35.

Figure 1

Comparison of the Data provided by Each of the Four Profit and Loss Account Formats Allowable under the 1981 Companies Act

Format 3	Format 1	Format 2	Format 4
B1	1 Turnover	1 Turnover	B1
		2 Change in Stocks	A1 + B2
		3 Own Work Capitalised	B3
		5a Raw Materials & Consumables	A2a
A1	2 Cost of Sales	5b Other External Charges	A2b
A2	4 Distribution Costs	6a Wages and Salaries	A3a
A3	5 Administration Expenses	6b Social Security Costs	A3b
		6c Other Pension Costs	A3c
		7b Exceptional amounts written off CA	A4b
		8 Other Operating Charges	A5
Sch 1.1 (17)	Sch 1.1 (17) Depn. inc. in 2, 4 & 5	7a Depreciation	A4a
B2	6 Other Operating Income	4 Other Operating Income	B4
B3	7 Income from Group Companies	9 Income from Group Companies	B5
B4	8 Income from Related Companies	10 Income from Related Companies	B6
B5	9 Income from FA Investments	11 Income from FA Investments	B7
B6	10 Other Interest Receivable	12 Other Interest Receivable	B8
A4	11 Amounts written off Investments	13 Amounts written off Investments	A6
A5	12 Interest Payable	14 Interest Payable	A7
A6	13 Tax on Ordinary Activities	15 Tax on Ordinary Activities	A8
B8	15 Extraordinary Income	17 Extraordinary Income	B10
A8	16 Extraordinary Charges	18 Extraordinary Charges	A10
A9	18 Tax on Extraordinary Profit	20 Tax on Extraordinary Profit	A11
A10	19 Other Tax	21 Other Tax	A12

sional analysis departments are organised this way and in principle the same separation arises whenever accounting data is used via EXTEL cards or computer services such as Datastream. However, the proposition is that the trend will be accelerated by the advent of microcomputers.

The reasoning behind this view is that a trade off exists between the cost of extracting data where there are economies from centralisation and the cost of analysing data when there are diseconomies from centralisation. Computers appear to have already changed this balance to some extent and microcomputers seem likely to change it even more.

There is no real doubt that considerable economies can be derived from centralising data extraction. Most institutions with analysis departments extract almost exactly the same data from the same source documents. Banks for example regularly replicate each other's work by applying almost identical analysis procedures to the same companies.

For each individual institution the cost of data extraction is quite high. As a rough estimate it requires three or four analysts plus a couple of support staff to handle 2,000 sets of accounts a year. Thus the magnitude of the potential savings

is quite large. Furthermore in a large scale centralised data base the quality of extracted data is likely to be high. The extraction process will be easier to control and it will be easier to run sophisticated computer and manual quality checks. Also in a centralised database whenever one user finds an error it can be corrected for the benefit of other users.

On the other hand centrally collected data can easily generate new problems for the analyst. Some of these are fairly minor, like ensuring that the relevant computers are compatible and that the analysts are all properly trained. However there are also two major problems.

The first of these is the provision of appropriate software to get the data from the point of extraction to the generation of whatever analysis reports are required. This may have to cope with communicating the data between one computer and another but that is unlikely to be very difficult. Real problems are much more likely to arise in ensuring that software exists to produce precisely what the analyst wants. If not, it is likely that starting again with the original accounts will be easier than reworking inappropriate computer output.

The second major problem arises because an analyst who extracts his own data knows exactly

how each figure was derived so he understands any shortcomings. Consequently he can ensure that all extracted figures suit his analysis objectives as well as possible. By contrast, centrally collected data has to be aimed more generally and may not suit a specific application so well. Analysts will therefore need to spend some time checking the supplied data to ensure that the accounting interpretations are appropriate. If they are not appropriate the data will have to be modified. Should this turn out to be impossible or even difficult it may again be easier to scrap the computer analysis and use the original accounts.

Any computer system which falls foul of either of these problems will have little credibility with analysts. Indeed observation of a number of public and private analysis systems suggests that their success depends largely on how well these problems are overcome. To be successful a system must give analysts exactly, not roughly, what they want and the accounting interpretations must be the same as the analysts themselves would have used. These requirements are not easy to achieve but it does seem that micros can make a major contribution to the first and a minor contribution to the second.

Modern microcomputers are quite powerful enough to allow a vast range of different reports to be produced. The hardware is relatively cheap and easy to use. There are enough comparable machines, particularly using the MS DOS operating system, so that software is also plentiful and cheap; at least compared to mainframe software. And that software will not only handle financial analysis. There are also wordprocessors, data base management systems, statistics packages, graphics packages and financial modelling packages which can all use the same microcomputers. Thus for the outlay of a few thousand pounds a properly trained analyst can now manipulate accounting data with such flexibility that software limitations can be virtually disregarded. However, the scale of training required should not be underestimated.

The second problem is less tractable because there is so little a computer can do to ensure the correctness of underlying data.⁵ Some consistency and plausibility checks are possible and the micro at least makes it easy to change anything and rework the analysis. But the real problem continues! How in a computer system do you recognise an incorrect figure in the first place? This must be a matter of accounting policy not computing.

In fact, there are two fairly distinct accounting policy issues involved. One has been mentioned earlier. Published data will have to be simplified and standardised to fit into a computer system;

most of the explanatory notes will be lost and so will quite a lot of data. The second issue is that the agency carrying out the simplification, for instance EXTEL or Datastream, inevitably takes on a very significant role in the dissemination process. It acts as a kind of filter between the source documents and the user. Sometimes in the process of transmitting the data it may make quite important modifications. EXTEL, for example, frequently reclassifies exceptional and extraordinary items in accordance with common City usage which does not necessarily follow SSAP 6.

It would be difficult to influence the collecting agencies directly. The relevant policy would be better aimed at minimising the difference between the data they supply to their customers and the statutory data that they receive. In practice this means that accounting policy should take note of the output of the agencies and ensure that this is available on a consistent and comparable basis.

The range of techniques available in a computerised analysis system

A computer can offer powerful techniques of analysis which are not available in a manual system. This extension of the range of techniques is the basis for the next three propositions.

Proposition 4

A computerised analysis system would probably create any report directly from the underlying data. Consequently analysts will rarely work with published reports but instead will generate reports to their own specification from the raw data

It was explained above that in a computer system raw data would be extracted from the published accounts and all ephemeral information such as sub-totals or layout details would be lost. This means that when reports are generated they must be reconstituted from the raw data. At computer speed this is very easy but there is no way of knowing exactly how those reports were originally presented. As an example, Fig. 2 shows the balance sheet for British Home Stores as originally published and in the closest available reconstitution using the LBS version of MicroEXSTAT.

In practice reconstituting the reports in this way has some advantages. It means that they can be tailored to suit the analyst's precise needs and it also ensures that all reports will be as comparable as possible. Furthermore, the same raw data can be redisplayed in different ways which may give additional insights to the analyst.

Examples of this might include simple arithmetic such as the calculation of averages, horizontal or

⁵Rosenberg and Houglet (1974) describe tests based on abnormal changes but ratio plausibility tests and balance sheet decomposition methods may also be helpful.

Figure 2

LBS

Original

British Home Stores PLC

Balance Sheets

1983

1984

Actuals £thousand

Apr 2

Mar 31

Properties

105,858

119,653

Plant & equipment

43,021

47,314

Tangible Assets

148,879

166,967

Intangible assets

19,030

20,699

Related companies

4,238

6,822

Other fixed assets

172,147

194,488

Fixed Assets

Stock

53,655

57,281

Debtors

5,899

7,834

Securities

48,390

72,886

Other current assets

1,422

407

Current Assets

109,366

138,408

Creditors

24,016

28,731

Current tax due

16,687

30,801

Proposed dividends

7,213

8,796

Other current liab

2,250

1,200

Current Liabilities

50,166

69,528

Working Capital

59,200

68,880

Capital Employed

231,347

263,368

Ordinary shares

51,520

51,737

Reserves

133,621

153,815

Ordinary Equity

185,141

205,552

Preference shares

400

400

Minorities

Deferred liabilities

16,488

18,575

Deferred tax

29,206

28,674

Debentures and bonds

Other L & M loans

Long and Medium Liab

46,094

47,649

Net Assets

231,235

253,201

Short bank loans

10,055

Other short loans

112

112

Short Term Loans

112

10,167

Capital Employed

231,347

263,368

Balance Sheets
at 31 March 1984

BRITISH HOME STORES PLC

Group

1984

1983

Note

£000

£000

Fixed assets

Tangible assets

9

170,848

149,652

Investments

11

23,199

23,030

194,047

172,682

Current assets

Stocks

57,281

53,655

Debtors

15

8,682

6,786

Cash at bank and
in hand

72,886

48,390

138,849

108,831

Creditors: amounts
falling due within
one year

16

79,695

50,278

Net current assets

59,154

58,553

Total assets less
current liabilities

253,201

231,235

Creditors: amounts
falling due after more
than one year

Loan capital

17

28,674

29,206

Corporation tax

5

15,913

14,905

Provision for liabilities
and charges

Deferred taxation

18

2,662

1,583

205,952

185,541

Capital and reserves

Called up share
capital

19

52,137

51,920

Share premium
account

20

2,666

1,311

Revaluation reserve

20

2,502

2,540

Other reserves

20

3,861

3,861

Profit and loss
account

20

144,786

125,909

MAURICE HODGSON
R. W. BURGESS
Directors

Approved 8 May 1984

205,952

185,541

vertical common size statements and the like.⁶ Alternatively, it might involve a more fundamental rearrangement of the underlying data. Funds statements, for example, can tell a surprisingly different story depending on exactly how they are presented. In the same way foreign accounts can be transformed from being almost incomprehensible to being straightforward by redrafting them in the analyst's native language and using his familiar accounting conventions.

Whether it is technically possible to produce a particular report depends on having the appropriate software and the necessary raw data. Software, as explained above, is becoming much less of a problem and is in any case the analyst's problem and not a concern for accounting policy.

On the other hand, if raw data are lacking then no amount of clever software will be able to produce the required report from the published data. The problem can only be rectified by the appropriate accounting policy bodies. The example from the 1981 Companies Act given above illustrates this very well. It is an easy matter for a computer to convert a profit and loss account presented in format 1 into format 3. But there is no software solution that can convert format 1 into format 2. The disclosure is simply inadequate.

Proposition 5

A computer database will provide several years of data for each company and similar data for a large number of other companies. This volume of data will allow sophisticated statistical techniques to be used which in turn will require the data to be as consistent and comparable as possible

The truth of this proposition is probably sufficiently obvious to require very little comment and there are several excellent surveys which summarise the relevant techniques. All that will be attempted here is a very brief overview to highlight the need for both time series and cross sectional consistency.

A substantial research literature exists on the time series properties of accounting numbers and ratios because so much analysis centres around trends and patterns in those numbers.⁷ It is extremely easy to imagine patterns where none exist so an important problem is to establish whether observed patterns are indeed genuine. Genuine patterns would of course be most useful in financial diagnosis and forecasting.

Consistent time series data is also needed for some regression techniques which have been advo-

cated in the literature. The idea is to use the regression relationship between particular accounting numbers instead of just using the ratios. For example, one might estimate the regression line that exists between debtors and sales rather than calculating the collection period ratio.⁸ If a relationship fits well, it can be used, just like a ratio, to predict future behaviour or to analyse atypical past behaviour.

The advantage of this technique over conventional ratio analysis is that it provides both an objective measure of how well the relevant relationship fits and also an explicit equation for it. In the special case that the regression constant turns out to be zero then of course the regression approach and the conventional ratio approach are almost equivalent.

Another technique requiring similar data is decomposition analysis.⁹ This is a powerful method of measuring the extent to which the 'shape' of a company's balance sheet changes from year to year. Shape in this context refers to the balance sheet percentage structure and the technique allows analysis of this in finer and finer detail. Decomposition analysis appears to have some ability to predict financial distress, takeover and some other events. In addition, preliminary research indicates that it may also be a useful tool for identifying year to year data inconsistencies.

Cross sectional financial analysis is about comparing the figures for a target company with the appropriate average figures for some group of companies. It most commonly arises with the use of industry average ratios. Here the target company is compared with its industry to check whether any ratio levels or changes are abnormal. A slightly more sophisticated extension of the same idea uses regression analysis to measure explicitly the relationship between the company and its industry. The regression equation can then be used to separate out industry from company effects.

There is no particular reason to restrict this technique to conventional ratios or conventional industry classifications. For example research into corporate distress has classified companies into 'distressed' and 'not-distressed' groups. This allows the relevant ratios for a target company to be compared with each group to see whether it looks more like a distressed or not-distressed company. Research in the same area has frequently used discriminant analysis to establish Z scores instead of conventional ratios. This technique establishes weighted combinations of several ratios which

⁶Gibson and Friskoff (1982) discusses the value of these simple transformations in financial statement analysis.

⁷See Brooks and Buckmaster (1980); Deschamps and Mehta (1980); and Freeman, Ohlson and Penman (1982) for recent contributions to this extensive literature.

⁸Foster (1978), Whittington (1980) and Barnes (1982) discuss the use of regression as an alternative to conventional ratio analysis.

⁹Lev (1969) contains a good introduction to this technique and some typical applications are given in Ball, Lev and Watts (1976), Belkaoui (1976) and Walker, Stowe and Moriarty (1979).

often discriminate between groups better than any single ratio.¹⁰

The important point about all these techniques, both time series and cross sectional, is that they require consistent data. Otherwise it is hard to tell whether observed results are genuine or caused by non-comparability of the data. Another danger is that genuine results may not be noticed because they are swamped by data non-comparability.

Proposition 6

Formal corporate models are likely to be increasingly used by analysts and in such models the role of data is fairly clear cut. Consequently, it may become easier to distinguish between better and worse accounting disclosure

A few years ago, before Visicalc, most accountants would not have believed that sophisticated modelling software would become part of their daily lives. Nor that they would take to it with enthusiasm. Yet this is exactly what has happened. Today the relevant spread sheet programs are so common that they are sold in high street stores and advertised on television. Since many accountants and analysts regularly use these programs, often with great skill, it is sensible to expect them to have a major impact on the way financial analysis is carried out.

The most obvious application is to use a spread sheet program to automate the conventional calculations. This would be simple enough technically, although probably less effective than dedicated software. However, a much more rewarding approach is to use the spread sheet program to build a formal corporate model. Future earnings, cash flow, or whatever can then be forecast using the model. Alternatively the past can be analysed by comparing what should have happened with what actually did happen. In other words one can use methods very similar to those used in management accounting for budgeting and variance analysis. These are methods for which spread sheet programs are ideally suited and for which they are already commonly used.

In a formal modelling approach there are two distinct phases and each has different but quite well specified data needs. The first phase involves building the model. This includes both the specification of the model and the estimation of any necessary parameters. Not much accounting data is required for the specification. Concern is more with what makes theoretical sense and what has worked or not worked in the past. Accounting data is only important as a constraint because it makes no sense to specify a model requiring unavailable data. Of course if analysts are regularly having to

compromise their models for lack of data then accounting policy issues may be involved.

Once the model has been specified its parameters have to be estimated by appropriate statistical means. Therefore long runs of consistently defined data are needed. It is also here that the usefulness of the data can be judged very objectively.¹¹ When estimating a model, data are useful if they improve the fit but not otherwise. Of course, data which fail to improve the model are not useless in absolute terms because they still might be useful in another model or another context. For example Credit Sales might explain the year to year movement in Debtors better than Total Sales but nevertheless Total Sales might be relevant for some other purpose.

There are several ways of using a model but in most cases the first step is to make a forecast, the purpose being to find out what is likely to happen in the future or, alternatively, to find out what should have happened in the past. Either way, some data have to be fed into the model, specifying the assumptions and the starting point. Once this is done, its outputs—the forecasts—can be calculated. If different inputs are used then of course different outputs result. With some experimentation it is possible to find out a great deal about the relationship between different assumptions and their resulting forecasts. Sensitivity analysis of this type is very easy using spread sheet models and some programmes have powerful special features to allow different assumptions to be tested automatically.

The data required as input for a model may be quite different from the data needed for its estimation. Sometimes the input data may even be entirely imaginary; for example, if some unlikely scenario is being studied. But in general a certain amount of status quo data is required to start the model off from an actual point. However, long runs of historical data are rarely necessary in order to use a model and quite often only the most recent figures would be needed.

When a model is used to 'forecast the past' additional historical data will almost certainly be needed. This is because the object of such action would be to identify atypical behaviour by comparing historical actual values with the model's

¹⁰See Altman *et al* (1981), Ohlson (1980) and Scott (1981) for recent contributions to this extensive literature.

¹¹There is an important literature on the so called 'predictive ability' criterion. See for example Ashton (1974), Beaver, Kennelly and Voss (1968) or Watts & Zimmerman (1978). However, one must be careful not to make the same mistakes as some writers of assuming (a) that model estimation is the only use for data, (b) that data which does not improve the fit of one model would not improve the fit of any other model, or (c) that the ability of a variable to forecast itself is necessarily a guide to its value in some relevant context. In addition as Christenson (1982) has pointed out in his elegant attack on the 'predictive ability' methodology, one must be careful not to confuse prediction with explanation.

theoretical values. Actual data is therefore needed for comparison with the model's output.

If these data implications of modelling are brought together it is clear that data can be used in any of three different ways: (1) to estimate some model of the business; (2) as an input when using such a model; (3) to provide actual data for comparison with the output of a model. When data is not needed for any of these reasons it is of no value in a modelling context.

Summary and policy implications

The increased use of computers in financial analysis will have a number of consequences. One is that the source data is likely to be separated into 'foreground' data, which will be well structured and mostly numeric, and 'background' data which will be poorly structured and mostly text. The former will be stored in the computer system, will be easily accessed, and will have powerful software available to aid its interpretation. The latter may well continue to be stored in conventional files so access will be less convenient and probably less effective.

Only data items which are available for a large number of companies are likely to be stored in the foreground data base; and there may be no more than 150 such items stored for each company year. Thus explanatory notes, details of definitional problems, and even unique or unusually detailed disclosures are likely to be relegated to the background data. An important aspect of this for accounting policy is that the data extraction will not be carried out by the company or its auditors but by an agent such as EXTEL or Dun and Bradstreet.

The availability of large amounts of accounting data is likely significantly to change the methods that analysts use. Statistical methods will be increasingly used as will corporate modelling techniques using spread sheet programs. This will put a premium on data comparability both between companies and over time. It may also focus attention more clearly on what is relevant and irrelevant in accounting disclosure.

There are two general implications of all this for accounting policy. The first is that more emphasis should be given to ensuring that accounting data is comparable over time and between companies. The provision of additional fine detail is less important. The second implication is that the form of accounts will become much less important than their content. Computers can easily redraft the raw data into any required layout but, as was illus-

trated above using the example of the 1981 Companies Act, they cannot recreate missing data.

In addition to these general points some specific policy suggestions arose throughout the paper. One was that the output of data extraction agencies should be carefully scrutinised. Another was that the emerging computer based techniques of financial analysis should be monitored so that their data needs are understood.

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Walter Taplin Prize

The British Accounting Association, the Council of Departments of Accounting Studies and *Accounting and Business Research* offer a prize of £100 for the best article published in each annual volume. The prize is named in honour of the journal's founding editor, Walter Taplin. The winning article in 1982/83 was "The Political Implications of Accounting and Accounting Standard Setting" by David Solomons (Spring 1983).

Auditor Selection: An Incentive-Signalling Approach†

Sasson Bar-Yosef and Joshua Livnat

The concentration of auditors in specific industries has been documented by several researchers over a number of years [Zeff and Fossum 1967, Rhode *et al.* 1974, Schiff and Fried 1976, Dopuch and Simunic 1980, and recently Eichenseher and Danos 1981]. This became of concern to government policymakers [US Senate, 1975] and the American Institute of Certified Public Accountants [AICPA, 1980], which initiated studies to examine the effects of high concentrations on the small and medium-sized firms.

In investigating the causes of high auditor concentration within specific industries, Eichenseher and Danos [1981] suggested two explanatory variables: the frequency of new issues, and the level of regulatory control in the industry. These two variables were selected because they were assumed to be good surrogates of the auditor's economies of scale. Presumably, if the audit industry is competitive and the demand for audit services is price-inelastic, the presence of scale economies produces higher concentrations. To support their argument, Eichenseher and Danos presented evidence of significant correlations between concentration levels of auditors, the frequency of new issues of securities, and the level of regulatory control.

Two related matters were investigated by Simunic [1980] and DeAngelo [1981], who studied the effects of auditors' size on audit prices and quality, respectively. Using audit fees data, Simunic was unable to reject the hypothesis that large CPA firms follow the same pricing policies as their smaller competitors both in the less competitive market ('large' auditees) and in the more competitive market ('small' auditees). In addition, DeAngelo, pursuing a theoretical argument of client-specific quasi-rents, claims that larger audit firms would provide a higher quality audit because they are better able to resist clients' pressures. According to DeAngelo, larger auditors have a large number of clients, each contributing a small

proportion of the auditor's revenues and client-specific quasi-rents. Consequently, client threats of contract termination are less effective, thereby improving the audit quality.

The existence of differences in audit quality among audit firms seems to be an unsettled issue. Presumably, all auditors follow the same auditing standards and requirements. While smaller auditors may be in an inferior position to withstand clients' pressure, they may perform more thorough audits (due to personal relations with clients) and uncover a greater number of errors. Measuring the quality of an audit as the probability that an error that had been detected would be disclosed, as suggested by DeAngelo, appears to be only a partial measure of audit quality. Thus, classifying audit quality according to the size of the auditor, although empirically convenient, is theoretically unsatisfactory.

Nevertheless, two empirical findings warrant attention. Carpenter and Strawser [1971], replicating an AICPA study, found a high proportion of firms which preceded the decision to go public with a decision to switch to a larger auditor. Furthermore, Arnett and Danos [1979] reported that underwriters urged firms to make such switches to ensure higher prices for their securities. These findings, together with the consistent findings about high auditor concentrations, call for better understanding of the auditor selection process.

The purpose of this paper is to examine the process of auditor selection through a signalling approach. The signalling literature assumes a market where the seller of goods or services knows their quality but the buyer does not. Since buyers can not distinguish among products with different quality they price all products by using the average quality. At that price, sellers of products with higher than the average quality will refrain from trading and the market may collapse. One mechanism that corrects such a market failure is the signalling framework, where sellers signal their product quality to the uninformed buyer. The signal is in the form of a costly act taken by the seller to indicate the superiority of his product. The

†We would like to thank Germain Boer, Tim Devinney, Hayne Leland, Baruch Lev, Jim Ohlson, Hans Stoll, Anthony Zahorik and two anonymous referees for helpful comments on earlier drafts of the paper. Needless to say all remaining errors are ours.

higher the cost of the signal the higher is the indicated quality, because more is lost if the product does not prove to be of a quality that is commensurate with the price paid for it. The loss of the seller depends on the price that buyers are willing to pay for a product with a particular signal. At equilibrium, appropriate pricing by buyers will prevail and sellers will select an act that will disclose the true quality of their product. As a result, the market will continue to exist, although there may be some social waste because of an over investment in the signal.

A basic premise of our model is, therefore, the existence of asymmetry of information, i.e., managers of firms possess superior information about future cash flows.¹ Stockholders induce managers to disclose additional information by signalling it through the act of selecting an auditor. It is argued below that managers who perceive their firms to be superior will select larger auditors. The larger auditors set higher prices to compensate themselves for the incremental risk of litigation which is a function of their size.² It is shown that the selection of a large audit firm signals to the market that the manager expects his firm to have high future cash flows and determines the stock prices of firms by using this signal.

The next section describes the economic setting and the auditor selection process.

The economic environment

The fundamental premise about the economic environment is the existence of information asymmetry between stockholders and managers. Managers are assumed to possess superior knowledge about their firm's future cash flows. Stockholders, then, have a motive to induce managers to share this knowledge with capital market participants, so that the value of the firm will reflect the future cash flows as assessed by the manager. Our setting assumes, therefore, that stockholders determine

the manager's compensation in a way which induces him to disclose his assessments of future cash flows. Once these assessments are known, market equity prices will adjust to reflect the manager's information about future cash flows. In equilibrium, market prices will help the resource allocation in the economy, where firms with better assessments of future cash flows receive a larger amount of capital from stockholders.³

We assume that the manager will convey his future cash flow assessments by selecting an observable action which indicates his expectations. The manager is assumed to make decisions consistent with expected utility maximisation. Furthermore, according to our assumption, stockholders design the manager's compensation in a way that (i) induces him to disclose his assessments fully and instantaneously, and (ii) penalises him for actions which are inconsistent with his assessments (i.e., induces him not to deceive). Hence, such a compensation scheme consists of two components: (i) a component which depends on the firm's current market value, and (ii) a component which depends on the realisation of the firm's future cash flows.⁴ The first component motivates the manager to disclose fully and instantaneously his assessments of future cash flows, so that current market prices will reflect his assessments. The second component discourages him from taking an inappropriate action (for instance, a 'penalty' may be imposed when future cash flows are revealed).

The model assumes that the manager reveals his information by the selection of an auditor. Our environment assumes that exogenous regulation requires an outside auditor who can attest to the firm's financial statements. We further assume that audit firms provide identical services to their clients, performing essentially the same audit tests by using the same resources. The audit, therefore, is assumed to be of homogeneous quality across auditors. Auditors, however, vary in their exposure to losses that may result in cases of litigation. It is assumed that the larger the audit firm, the more resources it owns and the larger is its share of a loss in a case of litigation against the manager and the auditor.⁵ The size of the auditor, therefore, is assumed to suggest a higher expected cash flow to the stockholders, who may participate in a class action if they consider themselves misled by misrepresentations in the financial statements. We therefore assume that larger auditors require a higher audit fee to offset the incremental exposure

¹One should note that the current model assumes that managers have superior information about *future cash flows*. It is worth pointing out that this assumption is not hindered by the controversy regarding *earnings* forecasting ability. For example, Lorek *et al.* [1976] suggested that Box-Jenkins models of *earnings* are superior to the managerial forecasts. Penman [1980], on the other hand, documented the superior forecasting ability of managers. Since the earnings series differ from the cash flow series one cannot easily draw conclusions about forecasting ability from one series to the other.

²Note that this assumption may be inconsistent with the empirical findings reported by Simunic [1980]. However, his remarks indicate different pricing policies within the Big Eight CPA firms [pp. 183 and 188]. Moreover, any substitution between internal and external audit costs may result in an overall cost increase to the auditee if a large auditor is engaged. Indeed, the results reported by Simunic [Table 12] for the relation between the auditor size and the audit fee seem to be positive for at least one Big Eight CPA firm.

³Leland and Pyle [1977] have shown that the same set of projects will be adopted in a signalling equilibrium as would have been adopted in an equilibrium where investors have the same assessments as managers.

⁴Ross [1977].

⁵Empirical findings that support the greater frequencies of litigations brought against larger auditors are presented in Arnett and Danos [1979, pp. 34-9].

to risk that distinguishes them from smaller firms. Note that the size of the audit firm is considered an exogenous factor. Hence, we assume that auditors of various sizes participate in the market and that the auditors set their prices according to their size.⁶

The model assumes a single-period with two consumption points with a single trade. This model is adopted because of its analytical tractability. However, in a single-period setting, much of the audit process and the auditor's own information is eliminated. For example, one expects the auditor to be familiar with the auditee and the auditee's economic environment. Furthermore, the knowledge obtained by the auditor while examining the detailed records of the auditee is probably superior to the knowledge of an outside investor. Our environment, however, assumes that only the manager possesses superior information to which both the auditor and the outside investors are not exposed. Of course, one can model the various degrees of information that managers, auditors and investors possess, and the contracts they write to share this knowledge. Such an extension would sidetrack the present objective whilst making the analysis exceedingly complex; hence it is not developed here.

The setting assumes that at the beginning of the period the manager selects an auditor so as to maximise his expected utility. Stockholders observe this selection and determine the stock price by using the information which the manager reveals through the auditor selection.⁷ At the end of the period the cash flow of the firm is revealed and is distributed to stockholders, managers and the auditor. In some states of nature, the auditor may be sued and compelled to compensate stockholders, thus increasing their cash flows. Note that the role played by the auditor in this setting resembles the role of a co-insurer and not that of an information verifier. This role, although different from the standard role assigned to an auditor, is the consequence of our single-period model with no superior information possessed by the auditor. We feel, however, that the economic insights gained by this simplification are warranted.

The analysis assumes a particular form of the manager's compensation which is based on owning shares of the firm and on its future performance.

⁶The model developed in this paper analyses a partial equilibrium in a static environment. Such a model cannot explain the formation of audit firms with different sizes.

⁷The signalling mechanism requires the manager to take a costly action in order to convey his information. One may argue that over time stockholders may obtain such information through monitoring of the manager's behaviour. In a single-period model this argument is not admissible. Moreover, even in a multi-period framework the moral hazard problem is attenuated but does not disappear completely (Holmstrom [1980]).

It may be argued that this compensation scheme is not optimal socially or otherwise. However, the selection of such a normative scheme is effective in inducing the manager to signal his superior information to stockholders and is not highly hypothetical. The general form of the compensation function we posit seems to be prevalent in reality. Many corporations have incentive plans which are based on performance, and which provide no bonus if a certain goal is not met. We should note, however, the existence of other mechanisms that may eliminate the problem of information asymmetry. Such alternatives are discussed in Leland [1979, 1980].

The next section describes the auditor selection process.

The model

To make the model analytically tractable, we make the following assumptions:

(a) The manager total compensation function, M , equals:

$$M = \gamma_0 V_0(P_k) + \begin{cases} \gamma_1 \tilde{x} & \text{if } \tilde{x} \geq E_1 \\ 0 & \text{if } E_1 > \tilde{x} \geq E_2 \\ -L & \text{if } E_2 > \tilde{x} \end{cases} \quad (1)$$

γ_0 and γ_1 are the proportions of the firm that the manager receives at the beginning of the period, and at the end of the period if the performance deserves a bonus, respectively. $V_0(P_k)$ denotes the current value of the firm conditional on the selection of an auditor k who charges $\$P_k$ per hour of audit.

$\tilde{x}$ denotes the cash flow of the firm, which is assumed to be normally distributed:

$$\tilde{x} \sim N(\mu, \sigma^2) \quad (2)$$

E_1 , E_2 are bounds which classify cash flows as 'good', 'no-bonus', and 'bad'. Such values may be determined by transforming cash flows to accounting earnings and specifying a threshold, e.g., '8% above stockholders equity.' It is assumed that if cash flows exceed a threshold level E_1 a bonus is awarded. When cash flows fall short of this threshold but are not 'bad' the manager receives no additional compensation. If cash flows are bad, i.e. if they fall short of E_2 , a penalty of L is imposed on the manager. Such a penalty may take the form of employment termination without wage payments, or punitive payments imposed through litigation.

Note that such a compensation scheme is optimal for *all* stockholders despite the costs involved in this process. This is so because the revelation of additional information at time 0 enables the market to evaluate the securities correctly. Such correct evaluation is essential to security holders mainly for the following reasons: (i) stockholders require



knowledge of the values of their holding to enable them to plan their correct consumption and rearrange their holding portfolio, and (ii) if external funds are used to finance new projects which are undertaken by the firm, current stockholders may sustain a loss when the new equity is issued at a lower price than the correct value.

(b) The manager utility function over the two consumption dates is described by

$$U(C_0, C_1) = U(C_0) - \exp[-\phi C_1] \quad (3)$$

Thus, the utility function is time additive and is negative exponential with a risk tolerance level of ϕ in the manager's second period consumption.⁸

(c) The market consists of k auditors; each sets his billing rate per hour, P_k , as a function of his size S_k . An auditor k expects to share the losses incurred due to litigation in cases of 'bad' cash flows. His loss, A_k , is formally expressed as:

$$A_k = \begin{cases} 0 & \text{if } E_2 \leq \tilde{x} \\ R(S_k) & \text{if } E_2 > \tilde{x}. \end{cases}$$

We assume that the loss function of the auditor is affected by the probability that stockholders will pursue a litigation, and also by the expected payoffs as a result of the litigation. The probability of a litigation is affected by the following variables:

- (1) The ability of stockholders to recover their losses. The larger the auditor, i.e., the 'deeper pockets' he has, the better able he is to pay for stockholders' losses.
- (2) The 'quality' of the auditee. The lower the quality of the auditee the larger is the probability that a litigation will be forthcoming. The reason for that is that the lower the quality of a firm the easier it is to win the law suit and therefore the more is a litigation likely.
- (3) The size of stockholders' losses. The larger the losses the more likely a litigation becomes.

Our setting assumes that auditors do not have any superior knowledge about the expected cash flows of firms. Thus, a larger auditor may expect to be engaged by more auditees with 'poor' quality (low cash flows) and should therefore expect a higher probability of litigations. Also, as the size of the audit firm grows the number of its auditees increases and the probability of litigations increases at a faster rate because of the larger proportion of low cash flow firms which engage this large auditor. Thus, we expect the loss function of the auditor to increase monotonically with size due to the increase in the probability of litigations

that stems from both the better ability to recover losses and from its larger proportion of auditees with poor quality. Furthermore, we expect the rate of change of the loss function to increase monotonically with size because of the sharp increase in the number of low quality auditees which affect the probability of litigation. We therefore postulate the following relationship:

$$\begin{aligned} \frac{dR(S_k)}{dS_k} &> 0 \\ \frac{d^2R(S_k)}{dS_k^2} &> 0 \end{aligned} \quad (4)$$

(d) The audit is assumed to require H billing hours (regardless of the auditor's identity).

(e) Stockholders, auditors, and the manager are assumed to know the variance of the cash flow, σ^2 . Managers are assumed to know its mean, while both auditors and stockholders are assumed to have no knowledge at all about the mean of the cash flow, before the selection of the auditor is announced.⁹

(f) The manager is assumed to be endowed with $\bar{C}$ consumption units. He can only invest his excess 'goods' in a risk-free asset which yields a return of R_f . This assumption is made in order to guarantee that managers will not collude or otherwise deceive stockholders. It assumes away moral hazard problems.¹⁰

Given assumptions (a) and (b), the manager maximises his expected utility subject to his budget constraint. His problem can be formally written as

$$\begin{aligned} \max_{\{P_k, F\}} E[U(C_0, C_1)] &= \max_{\{P_k, F\}} \{EU(C_0) \\ &\quad + E[-\exp(-\phi C_1)]\} \quad (5) \\ \text{s.t. } C_0 + F &= \bar{C} + \gamma_0 V_0(P_k) \end{aligned}$$

where F is the manager's investment in the risk-free asset as assumed in (f). C_0 is the manager's initial consumption and C_1 is his future consumption and is equal to:

$$C_1 = FR_f + \begin{cases} (\gamma_0 + \gamma_1)\tilde{x} & \text{if } \tilde{x} \geq E_1 \\ \gamma_0\tilde{x} & \text{if } E_1 > \tilde{x} \geq E_2 \\ \gamma_0\tilde{x} - L & \text{if } E_2 > \tilde{x} \end{cases} \quad (6)$$

⁹This assumption is needed for a neater exposition of the results. It is not so unappealing given the stability of risk measures of security returns over time.

¹⁰We make the assumption that the manager can only invest in the risk-free asset for a neater exposition. A more general model may assume that the manager can invest in a market portfolio as well. However, as Ross [1977] showed, allowing the manager to trade in his firm's securities may result in false signals by the manager. Disclosure rules and insider trading rules effectively prevent the manager from making a profit on his direct investment in his firm's securities.

⁸We use the negative exponential utility function in our model because it possesses properties which makes our analysis tractable.

The budget constraint in (5) yields:¹¹

$$C_0 = \bar{C} + \gamma_0 V_0(P_k) - F \quad (7)$$

Using assumption (b), the maximisation problem (5) can be written therefore as:

$$\begin{aligned} \text{Max}_{\{P_k, F\}} T = & U_1[\bar{C} + \gamma_0 V_0(P_k) - F] \\ & - \int_{E_1}^{\infty} \exp\{-\phi[FR_f + (\gamma_0 + \gamma_1)\tilde{x}]\} f(\tilde{x}) dx \\ & - \int_{E_2}^{E_1} \exp[-\phi(FR_f + \gamma_0\tilde{x})] f(\tilde{x}) dx \\ & - \int_{-\infty}^{E_2} \exp[-\phi(FR_f + \gamma_0\tilde{x} - L)] f(\tilde{x}) dx \quad (8) \end{aligned}$$

Simplifying equation (8) yields:

$$\begin{aligned} \text{Max } T = & U_1[\bar{C} + \gamma_0 V_0(P_k) - F] - \exp[-\phi FR_f] \\ & \times \int_{E_1}^{\infty} \exp[-\phi(\gamma_0 + \gamma_1)\tilde{x}] f(\tilde{x}) dx \\ & - \exp[-\phi FR_f] \\ & \times \int_{-\infty}^{E_1} \exp[-\phi\gamma_0\tilde{x}] f(\tilde{x}) dx \\ & + \{\exp[\phi FR_f] - \exp[-\phi(FR_f - L)]\} \\ & \times \int_{-\infty}^{E_2} \exp[-\phi\gamma_0\tilde{x}] f(\tilde{x}) dx \quad (9) \end{aligned}$$

Following the properties of the normal distribution as derived in the Appendix, equation (9) can be written as:

$$\begin{aligned} \text{Max}_{\{P_k, F\}} T = & U_1[\bar{C} + \gamma_0 V_0(P_k) - F] - \exp[-\phi FR_f] \\ & \times \exp(K1) N\left[\frac{-E_1 + \mu}{\sigma} - (\gamma_0 + \gamma_1)\sigma\right] \\ & - \exp[-\phi FR_f] \exp[K2] N\left[\frac{E_1 - \mu}{\sigma} + \phi\gamma_0\sigma\right] \\ & - \exp[-\phi FR_f] [\exp(\phi L) - 1] \\ & \times \exp[K2] N\left[\frac{E_2 - \mu}{\sigma} + \phi\gamma_0\sigma\right] \end{aligned}$$

where

$$\begin{aligned} K1 = & -\phi(\gamma_0 + \gamma_1)\mu + \frac{1}{2}\phi^2(\gamma_0 + \gamma_1)^2\sigma^2 \\ K2 = & -\phi\gamma_0\mu + \frac{1}{2}\phi^2\gamma_0^2\sigma^2 \end{aligned}$$

¹¹The budget constraint implicitly assumes that the manager cannot cash his bonus in period 0 for consumption purposes. This assumption is necessary to ensure a correct signal by the manager. Since outsiders do not know the mean of the cash flow they would be unable to determine the cash value of his bonus in the absence of a correct signal about the mean. This assumption seems to be justified on practical grounds as well. Most stock option agreements are conditional on the continuation of employment for a specified time period.

Defining:

$$\begin{aligned} K = & \exp[K1] N[(-E + \mu)/\sigma - \phi(\gamma_0 + \gamma_1)\sigma] \\ & + \exp[K2] N(E_1 - \mu)/\sigma + \phi\gamma_0\sigma \\ & + [\exp(\phi L) - 1] \exp[K2] N[(E_2 - \mu)/\sigma \\ & + \phi\gamma_0\sigma] \end{aligned}$$

equation (10) becomes:

$$\text{Max}_{\{P_k, F\}} T = U_1[C_0 + \gamma_0 V_0(P_k) - F] - \exp[-\phi R_f F] K \quad (11)$$

To maximise T with respect to F and P_k one has to postulate the market value of the firm, $V_0(P_k)$. We use the following valuation model:

$$V_0(P_k) = \frac{E(\tilde{x} | P_k) + [R(S_k) + L]P_r(\tilde{x} \leq E_2 | P_k)}{1 + d} - P_k H \quad (12)$$

The current value of the firm is its expected cash flows, provided that auditor k is selected, and discounted by a risk-adjusted rate, d .¹²

Following Spence [1974], it is argued that in order to obtain a signalling equilibrium, the signal issued by the manager must be unique, i.e. by observing the manager's signal, stockholders can compute the firm's expected cash flow and consequently determine its market value unambiguously. That is, signalling equilibrium requires that, after the issuance of the signal, no 'noise' will remain in the system. Hence, such equilibrium implies:

$$E(\tilde{X} | P_k) = \mu \quad (13)$$

and therefore

$$V_0(P_k) = \frac{\mu + [R(S_k) + L] N\left[\frac{E_2 - \mu}{\sigma}\right]}{1 + d} - P_k H \quad (14)$$

Substituting (14) into (11) and differentiating with respect to F and P_k provides:

$$\begin{aligned} \frac{\partial T}{\partial F} = & \frac{\partial U_1(C)}{\partial C} (-1) + \phi R_f K \exp[-\phi R_f F] \\ \frac{\partial T}{\partial P_k} = & \frac{\partial U_1(C)}{\partial C} \gamma_0 \left\{ \frac{1}{1 + d} \frac{\partial R(S_k)}{\partial P_k} \right. \\ & \left. \times N\left[\frac{E_2 - \mu}{\sigma}\right] - H \right\} \quad (15) \end{aligned}$$

¹²The discount rate is adjusted to reflect the risk of the firm's cash flow, σ^2 . The latter was assumed to be known to investors and is therefore independent of the signal.

The values F^* and P_k^* which maximise T in equations (15) are:

$$F^* = \frac{-1}{\phi R_f} \ln \left[\frac{\partial U_1(C)}{\partial C} \frac{1}{\phi R_f K} \right] \quad (16)$$

$$\frac{\partial R(S_k^*)}{\partial P_k^*} = H(1+d) \frac{1}{N \left[\frac{E_2 - \mu}{\sigma} \right]} \quad (17)$$

The results (16) and (17) provide the optimal conditions for auditor selection and are intuitively reasonable. The investment in the risk-free asset is to the point where the marginal utility of current consumption equals the expected marginal utility of future consumption. Also, the marginal dollar paid to the auditor should be equal to the marginal expected cash flow to the firm from the auditor in cases of 'bad' performance.

To find the sensitivity of the optimal selection of an auditor to changes in the fundamental variables, we derive equation (17) with respect to μ :

$$\begin{aligned} \frac{d^2 R(S_k^*)}{d(P_k^*)^2} \frac{dP_k^*}{d\mu} \\ = H(1+d) \frac{-1}{\left\{ N \left[\frac{E_2 - \mu}{\sigma} \right]^2 \right\}} \frac{-\mu}{\sigma} \end{aligned} \quad (18)$$

which yields:

$$\begin{aligned} \frac{dP_k^*}{d\mu} = H(1+d) \frac{\mu}{\sigma} \frac{dN}{dz} \frac{1}{\left\{ N \left[\frac{E_2 - \mu}{\sigma^2} \right]^2 \right\}} \\ \times \frac{d^2 R(S_k^*)}{d(P_k^*)^2} \end{aligned} \quad (19)$$

To evaluate this derivative, we must determine the sign of the last term on the right-hand side of equation (19) since all other terms are positive:

$$\frac{d^2 R(S_k^*)}{d(P_k^*)^2} = \frac{d^2 R(S_k)}{dS_k^2} \left[\frac{dS_k^2}{dP_k} \right] + \frac{dR(S_k)}{dS_k} \frac{d^2(S_k)}{dP_k^2} \quad (20)$$

Recalling equation (4) and assuming

$$\frac{d^2(S_k)}{dP_k^2} > 0^{13} \quad \text{and} \quad \mu > 0$$

¹³We assume that the auditor sets the billing rate P_k so as to compensate for possible losses due to litigations. Thus, the billing rate is assumed to increase monotonically with the size of the auditor. We also assume that the rate of change in the billing rate decreases with size. The reason is that the larger is the auditor the more diversified he becomes and the less he needs to increase the billing rate. Thus, we assume that

$$\frac{d^2 P_k}{dS_k^2} < 0$$

It is easy to show that under these assumptions the derivative of the inverse function is positive, i.e.,

$$\frac{d^2(S_k)}{dP_k^2} > 0$$

we find in equation (19):

$$\frac{dP_k^*}{d\mu} > 0 \quad (21)$$

A similar derivation can be used for H and one gets:

$$\frac{d^2 R(S_k^*)}{d(P_k^*)^2} \frac{dP_k^*}{dH} = (1+d) \frac{1}{N \left[\frac{E_2 - \mu}{\sigma} \right]} \quad (22)$$

which yields:

$$\frac{dP_k^*}{dH} = (1+d) \frac{1}{N \left[\frac{E_2 - \mu}{\sigma} \right]} \frac{1}{\frac{d^2 R(S_k^*)}{d(P_k^*)^2}} \quad (23)$$

Following the same arguments as for equation (20) we get

$$\frac{dP_k^*}{dH} > 0 \quad (24)$$

Thus, in terms of comparative statics, the model shows that the higher the manager's expectation of cash flows, the larger the auditor he will engage. The reason for this is as follows. Engaging a large auditor has two simultaneous effects on the current value of the firm as shown in equation (14). The first effect is to provide insurance for stockholders who can recover larger amounts from the auditor in cases of 'bad' cash flows. The second effect is the larger cash outlay needed to engage a large auditor. It is important to note that the manager does not benefit directly from future recovery of losses and has therefore no interest in providing costly 'insurance' to stockholders except to signal high expectation of cash flows. Consequently, a manager will be willing to pay a larger audit fee only when he wishes to signal higher expectations. Similarly, the more time necessary to complete the audit, the more pronounced is the signal to the market and the more incentive the manager has to engage a larger auditor.

The next section discusses the implications of our analysis.

Discussion

In this section we discuss the implications of the model for stockholders, policymakers, and market studies.

Stockholders

Stockholders in this setting play an important role: they design the compensation scheme, and in particular they set E_1 and E_2 which classify performance as 'good' or 'bad'. These bounds are designed to prevent the manager from signalling his firm as a high expected cash flow firm, while in

fact the firm may not be such. The penalty for a false signal comes through the compensation at the end of the period, and, in particular, through E_1 and E_2 . Thus, these bounds must be set such that they will ensure a correct signal and will also be able to classify firms according to their expectations of cash flows. In addition, stockholders set the proportions of the firm γ_0 and γ_1 , which the manager receives at the beginning of the period and as a bonus at the end. However, such proportions may be exogenously set by a market for managers, as well as a penalty in cases of 'bad' performance.

As the results of the model suggest, stockholders may prefer firms with a larger auditor for two reasons. A larger auditor is able to bear a larger share of the losses in cases of 'bad' performance, and a larger auditor signals higher expected cash flows. Both of these factors appear to be empirically verified. Arnett and Danos [1979, pp. 34-39] report higher frequency of litigations against larger audit firms. A larger auditor thus may be perceived as having 'deeper pockets which presumably can be tapped in the event it is proven that the firm's negligence resulted in misleading statements which caused the user to act to his detriment' [1979, p. 9]. Arnett and Danos continue further: 'Although we understand such reasoning we are unsympathetic to it...it could contribute to greater concentration in the profession.' Thus, the notion of larger auditors bearing a larger share of the losses appears to be empirically valid. In addition, both Carpenter and Strawser [1971] and Arnett and Danos [1979] report that underwriters feel that securities may sell at a higher price if a larger auditor is engaged. These findings are consistent with a signal that is transmitted to potential investors about future cash flows.¹⁴

Policymakers and Accounting Regulators

The signalling mechanism which has been exhibited above may be one of the reasons for high concentration levels. Although it is usually argued that high concentration indicates monopoly power with some social loss, care must be taken in its application to the audit industry. Note that the selection of an auditor signals information about expected cash flows which may improve resource allocation in the economy. Any elimination of the signalling activity by de-monopolising the audit industry, may result in a higher social cost, because alternative mechanisms of signalling may be more costly. Care must therefore be exercised before any

conclusions about the negative aspects of concentrations are reached.

The model also suggests that the signalling activity is sensitive to the scope of the required audit. H. Equation (24) suggests that the larger the required audits, the more likely the manager is to use a larger auditor, thereby transmitting a signal to stockholders. One can, therefore, suggest that the more disclosure requirements are imposed on firms by accounting regulators, the higher concentration levels one may find. This, of course, is consistent with the empirical findings of Eichenseher and Danos [1981] who found higher correlation between the level of regulation and the concentration ratio in an industry.

The model may contribute to the explanation of the voluntary disclosure of accounting information and the voluntary increase in the scope of an audit. Both may be viewed as actions which strengthen the signal made by the selection of an auditor, and can be tested empirically. Such tests were made by Chow [1982] relating to the occurrence of voluntary audits in 1926, before the mandatory requirement to publish audited financial statements. Other studies have related to the voluntary disclosure of information. For example, Lorek *et al.* [1976] and Penman [1980] have investigated management forecasts and Ronen and Livnat [1981] have investigated segment reports. Such tests may be specifically structured to analyse the implications of our theoretical model. The model suggests that higher expected cash flow firms may be more likely to engage voluntarily in an audit or to disclose voluntarily some information. One can group firms according to expected cash flows and test whether the frequency of voluntary audits or information is larger for firms with high expected cash flows than low expected cash flows.

Market Studies

The main implication of the model for market studies is its contribution to the explanation of voluntary information that management discloses. As the model suggests, the magnitude of such disclosure is very important in conveying managerial assessments about future cash flows. Moreover, the model suggests that the *act* of voluntary disclosure has important implications about the firm's value, in addition to the *content* of the information. Market studies of voluntary disclosure should consider both the effect of the act of disclosure, and the effect of the information content on the value of the firm.

For example, Anderson and Frankle [1980] found that firms that voluntarily furnished social disclosures performed better than non-disclosing firms. However, when they tested firms that voluntarily disclosed social information for two successive years against firms that voluntarily disclosed such information only in the second year, they

¹⁴Arnett and Danos also report that bankers may request firms asking for sizable loans to provide financial statements audited by a larger audit firm. This may be another mechanism for screening applicants of loans. See Chiang and Finkelstein [1982] for such an analysis.

found that the first group of firms outperformed the second group. Since these results were counter to their expectations, Anderson and Frankle [1980, p. 474] remarked that 'a definitive reason for the above results... is not readily available.' Our model suggests an explanation. Firms that engage in voluntary social disclosure convey to the market their assessments of future cash flows. An action of voluntary disclosure by the manager one year after another reinforces market interpretation of his assessments more than such a disclosure for one year. Rather than searching for the *content* of the disclosure, the researchers should have focussed on the *act* of disclosure, which is reinforced when it is repeated for two successive years.

Summary and conclusions

The current study investigates the process of auditor selection. The asymmetry of information between managers and stockholders motivates the latter to induce managers to disclose their assessments of future cash flows. The study examines the selection of an auditor as an action which conveys assessments of future cash flows to market participants. The model shows that a manager who is more optimistic about his firm's cash flows is likely to engage a larger auditor, thereby conveying his assessments to market agents. Thus, one may find firms which issue securities switching to large audit firms. Also, the high concentrations of auditors can be explained by the desire of managers to engage large auditors.¹⁵ Contrary to policymakers' expectations, the mandatory elimination of these high concentration levels may have negative effects on firms' values. Since managers will then be less able to convey their assessments, firms' values may decrease, and the efficiency of resource allocation in the economy may deteriorate. The concentration levels in the auditing industry should not be taken only as a signal of monopoly power and higher audit fees. Empirical findings about auditor switches before securities issuances and market reactions to voluntary social disclosure are consistent with the model's results.

Appendix

In our derivations we shall use the following properties of the normal distribution function:

$$\text{Define } N(z) = \int_{-\infty}^z \frac{1}{\sqrt{2\pi}} \exp\left[-\frac{Z^2}{2}\right]$$

¹⁵Leland and Pyle [1976] studied the information content of the proportion retained by the manager-owner when his firm goes public. Our conclusions and results are consistent with theirs.

then:

$$\int_{-\infty}^a f(\tilde{x}) dx = N\left[\frac{a - \mu}{\sigma}\right] \quad \text{if } f(\tilde{x}) = \int_{-\infty}^a \frac{1}{\sqrt{2\mu\sigma}} \exp\left[-\frac{(x - \mu)^2}{2\sigma^2}\right] \quad (1)$$

$$\int_a^{\infty} f(\tilde{x}) dx = N\left[\frac{-a + \mu}{\sigma}\right] \quad (2)$$

$$\int_a^{\infty} \exp[-\phi x] f(\tilde{x}) dx = \exp[-\phi\mu + \frac{1}{2}\phi^2\sigma^2] N\left[\frac{-a + \mu}{\sigma} - \phi\sigma\right] \quad (3)$$

Properties (1) and (2) are well known and no proof is necessary.

Proof of (3):

$$\begin{aligned} \int_a^{\infty} \exp[-\phi\tilde{x}] f(\tilde{x}) dx \\ = \int_a^{\infty} \frac{1}{\sigma\sqrt{2\mu}} \exp\left[\frac{-(x - \mu)^2}{2\sigma^2} - \phi x\right] dx \end{aligned}$$

Note that:

$$\begin{aligned} \left[-\frac{(x - \mu)^2}{2\sigma^2} - \phi x\right] \\ = -\frac{[x - \mu + \phi\sigma^2]^2}{2\sigma^2} + \frac{\phi^2\sigma^2}{2} - \phi\mu \end{aligned}$$

Thus,

$$\begin{aligned} \int_a^{\infty} \frac{1}{\sigma\sqrt{2\mu}} \exp\left[\frac{\phi^2\sigma^2}{2} - \phi\mu\right] \\ \times \exp\left[-\frac{(x - \mu + \phi\sigma^2)^2}{2\sigma^2}\right] \end{aligned}$$

by (2)

$$\begin{aligned} = \exp\left[\frac{\phi^2\sigma^2}{2} - \phi\mu\right] N\left[\frac{-a + \mu - \phi\sigma^2}{\sigma}\right] \\ = \exp\left[\frac{\phi^2\sigma^2}{2} - \phi\mu\right] N\left[\frac{-a + \mu}{\sigma} - \phi\sigma\right] \end{aligned}$$

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Introduction

A large literature has developed regarding the problem of statistical inference based on samples from accounting populations. The problem is essentially one of constructing proper point estimators, and related confidence limits, for the total audit value or total error in an accounting population, such as one of accounts receivable, sales invoices, inventories and fixed assets. Various types of estimators have been studied (mean-per-unit, ratio, difference, combined attribute-variable, etc.), based on different methods of sample selection (simple and stratified random sampling, dollar unit sampling (DUS), etc.).

With the exception of DUS limits,¹ confidence limits for the population total audit value are essentially constructed under the assumption that the estimator is approximately normally distributed for the given sample size (Neter and Loebbecke, 1975, p. 30). Thus, for example, a $100(1 - \alpha)\%$ two-sided confidence interval for the population total audit value (τ) based on estimator $\bar{X}$ is calculated as $\bar{X} \pm U_{\alpha/2} \cdot S(\bar{X})$, where $S(\bar{X})$ is the estimated standard error of $\bar{X}$, and $U_{\alpha/2}$ is the upper $100\alpha/2$ -percentile of the unit normal distribution. It is well known from analytical and simulation studies that the sample size required to achieve a satisfactory approximation to the actual distribution of the statistic $(\bar{X} - \tau)/S(\bar{X})$ —upon which the confidence interval is based—depends on the shape of the population distribution of audit values.

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¹Most DUS limits are designed to deal with accounting populations having low error rates. An evaluation of the properties of these limits and a comparison with normal-based estimators are given by Reneau (1978). Garstka and Ohlson (1979) have recently proposed a procedure using a modified ratio estimator in DUS. A non-parametric method for constructing confidence limits in DUS has been developed by Neter, Leitch and Fienberg (1978) and later modified by Leitch, Neter, Plante and Sinha (1982).

Since accounting populations tend to be highly skewed, the sample size required to ensure approximate normality may be too large in relation to the size of samples normally taken in auditing practice. Any inference based on the normality assumption and these relatively small samples may well be unreliable and potentially misleading (Neter and Loebbecke, 1975, p. 134).

A potential improvement in the reliability of confidence limits may thus be to use methods which take advantage of knowledge of patterns frequently encountered in accounting populations. The objective of this paper is to provide some evidence in support of the log-normal distribution as a simple and flexible model for accounting populations, and to bring to the attention of auditors an exact method for constructing confidence limits for the total audit value when the population audit values can be assumed to be log-normal.² A special advantage of this method is that it is applicable for small as well as large sample sizes.

Accounting populations and the log-normal distribution

Although much is known about actual accounting populations of book values, far less information is available about populations of audit values or errors than is necessary to develop universally applicable sampling methods. However, the evidence presented in the literature appears to suggest a number of common features including: (a) distributions of book values tend to have a high degree of positive skewness; (b) the error rate can be quite small so that most accounting units have a book value equal to the audit value; (c) errors may be

²The distribution of the audit values is said to be log-normal if the distribution of the logarithm of audit values is normal. An exact $(1 - \alpha)$ confidence limit for the population total audit value is one which will contain the population total audit value exactly $100(1 - \alpha)\%$ of the time in repeated sampling. It is to be contrasted with approximate confidence limits which are usually theoretically justified for infinitely large samples only. Finally, the reliability of a confidence limit refers to the long-run relative frequency with which the limit contains the population total audit value; the closer this relative frequency is to the nominal confidence level, the more reliable the limit is.

either overstatements or understatements; (d) there is no significant relationship between the error rate and book value; and (e) there is a tendency for the expected absolute error to increase with book values (Neter and Loebbecke, 1975, Ch. 2; Garstka and Ohlson, 1979, pp. 40-41; Ramage *et al.*, 1979; Johnson *et al.*, 1981).

The observed high degree of positive skewness of book values may well be described by a log-normal distribution. The relationship among the audit value (A), book value (B) and error factor (E) can be written as $(A) = (B)(E)$, where B can be assumed to be positive. When $E = 1$, the unit is correct; $E < 1$ implies an overstatement error; and $E > 1$ an understatement error. Observations (b) and (c) above strongly indicate that E can be expected to cluster around the value 1. Consequently, the distribution of A is reasonably expected to be similar to that of B , that is, to a log-normal distribution.

A priori reasons also suggest that many populations of audit values are highly skewed. For example, in accounts receivable (debtors) data, one would normally expect a large number of small accounts, more medium-sized accounts and fewer large accounts. This pattern may fit the log-normal distribution well. Since the log-normal distribution can represent various degrees of skewness, it may be used to describe a wide range of empirical data.

The log-normal distribution has been extensively studied. Aitchison and Brown (1957, Chapters 10, 11) provided various examples of its applications in economics and other disciplines. Holt *et al.* (1960, pp.281-98) found it suitable to describe the empirical distributions of a wide variety of sales and related data. More recently, Hilliard and Leitch (1975) argued for its applicability in cost-volume-profit distributions.

Figures 1 to 4 show the relative frequency distributions of the natural logarithm of audit values for the four accounting populations studied by Neter and Loebbecke (1975, Ch. 2) and for comparison, appropriately fitted normal distributions.³ These empirical populations are widely known in audit sampling literature and have been used extensively in simulation studies of the performance of point and interval estimators (for recent examples see Frost and Tamura, 1982; and

Duke, Neter and Leitch, 1982). Population 1 consists of 8,309 accounts receivable of a freight company and has an actual error rate of about 29%. Population 2 represents 5,482 inventory (stock) items with an error rate of about 71%. Population 3 consists of 7,026 accounts receivable with balances under \$100,000 of a medium-sized manufacturer and has an error rate of about 7%. Population 4 is a set of 4,033 trade accounts of a

Figure 1
Distribution of Log_e (audit value), population 1, error rate 30%

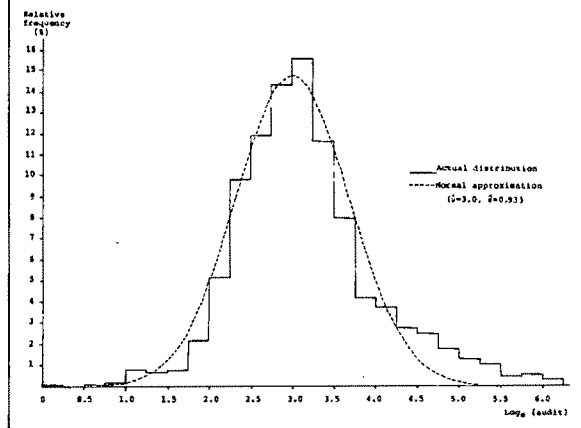


Figure 2
Distribution of Log_e (audit value), population 2, error rate 70%

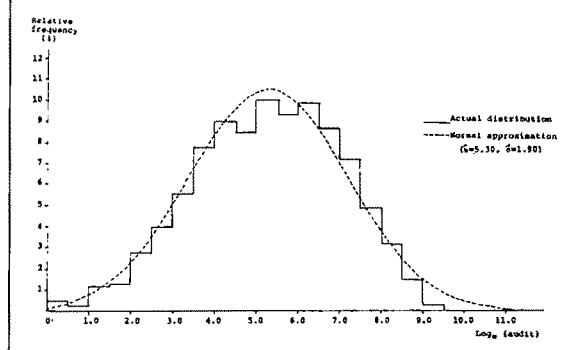
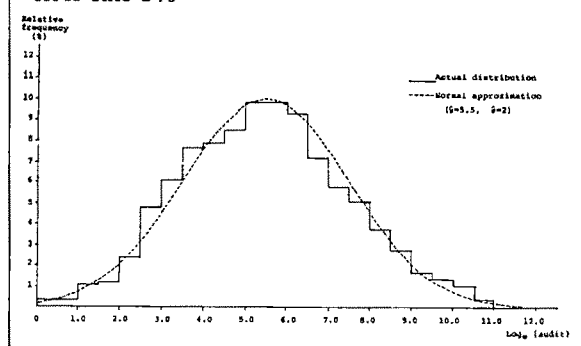
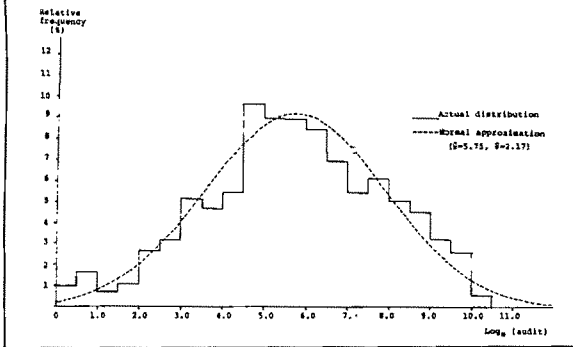


Figure 3
Distribution of Log_e (audit value), population 3, error rate 5%



³It should be noted that Neter and Loebbecke created several study populations from the actual ones. The distributions of audit values shown in Figures 1 to 4 correspond to the study populations which have an error rate closest to the actual error rate. Thus, Figure 1 shows the distribution of audit values in study population 1 (SP1) with an error rate of 30%. Similarly, Figure 2 is based on SP2 (70%); Figure 3 on SP3 (5%); and Figure 4 on SP4 (5%). In several cases, the audit value of an account was given as \$0. Since the logarithm of 0 is not defined, the presence of zero audit values creates a problem in applying the log-normal distribution (see also footnote 5). The percentages of zero audit values in the four populations are 0, 4, 2 and 3%, respectively.

Figure 4
Distribution of Log_e (audit value), population 4,
error rate 5%



large manufacturer with an error rate of about 6%. Although the fit of the approximating normal distribution is not perfect, it is close enough to support the contention that the log-normal distribution lends itself well as a model in accounting populations.⁴ The practical issue, of course, is the extent to which methods applicable for log-normal distributions can be applied to populations that are only approximately log-normal. This problem is examined in detail later.

Testing a distribution for log-normality

An auditor who selects a random sample with replacement of n accounting units from a certain population can ascertain the book (b_i) and audit (a_i) values of each selected unit. (When the sample size is small relative to the population size, sampling with and without replacement produce practically the same results.) To test the hypothesis that the population distribution of audit values is log-normal, it is sufficient to test, using sample data, the equivalent hypothesis that the distribution of the logarithm of audit values is normal. The familiar chi-square test may be applied. Alternatively, the more precise Lilliefos (1967) statistics can be used when the sample size is small (say less than 30) and the parameters are unknown. The sample mean and variance given below may be used as estimates of the respective normal population parameters:

$$\bar{y} = \frac{1}{n} \sum_{i=1}^n \log_e a_i = \frac{1}{n} \sum_{i=1}^n y_i \quad (1)$$

⁴The values of the familiar chi-square statistic for goodness of fit are 72350, 1639, 183 and 802, respectively, for the four N & L populations examined; these statistics are based on 14, 19, 23 and 22 intervals, respectively. It should perhaps be pointed out that a 'test' of goodness of fit is not appropriate here. Such a test is meaningful when the question is whether or not a *sample* is drawn from a population distribution with specified form. In our case, the question is whether or not a *population* distribution may be adequately represented by one of given form, a question which we address with some care later.

and

$$s^2 = \frac{1}{n-1} \sum_{i=1}^n (y_i - \bar{y})^2 \quad (2)$$

where $y_i = \log_e a_i$.⁵

Exact confidence limits for the total of a log-normal population

A method for constructing exact confidence limits for samples from a log-normal population has been presented by Land (1971, 1973). However, the presentation, the complex notation and the context of the original papers left the Land method quite inaccessible to the auditing profession. This section clarifies the Land procedure and provides a numerical example to demonstrate its application in auditing.

A $100(1 - \alpha)\%$ two-sided confidence interval for the population total audit value (τ), is the interval from Ne^{m-} to Ne^{m+} , where n is the number of units in the population, and

$$m+ = \left(\bar{y} + \frac{s^2}{2} \right) + \frac{s}{\sqrt{n-1}} C_+(s; n-1, 1-\alpha), \quad (3)$$

$$m- = \left(\bar{y} + \frac{s^2}{2} \right) + \frac{s}{\sqrt{n-1}} C_-(s; n-1, 1-\alpha). \quad (4)$$

$C_-(.)$ and $C_+(.)$ are factors—similar to the $U_{\alpha/2}$ —obtained from special tables provided by Land (1973, p. 962). They depend on s , $n-1$ and $1-\alpha$.⁶

If we let B be the known population total book value and M the materiality amount, the auditor would accept the recorded book amount as materially correct if both of the following conditions are satisfied (Garstka and Ohlson, 1979, p. 25):

$$|B - Ne^{m-}| \leq M \quad (5)$$

and

$$|B - Ne^{m+}| \leq M \quad (6)$$

⁵As noted earlier, the possibility that some audit values will be equal to zero poses an awkward problem, since the logarithm of zero is not defined. A simple solution may be to replace zero by a small number such as \$1.00 and then proceed in a straightforward manner. It has been implicitly assumed that audit values cannot be negative, an assumption believed to be reasonable in most audits. Should negative audit values be present, they normally indicate peculiar problems and should therefore be isolated from the normal inference procedures.

⁶A complete set of tables for the Land procedure is available from the American Mathematical Society, P.O. Box 6248, Providence, Rhode Island, 02940, USA.

To illustrate, suppose that a random sample with replacement $n = 21$ accounts from a log-normal population of $N = 1,000$ accounts yields $\bar{y} = 2.3$ and $s = 0.1$. For a 95% two-sided confidence interval, $C_{-}(0.1; 20, 0.95) = -1.998$, and $C_{+}(0.1; 20, 0.95) = 2.084$. Thus,

$$m^{-} = \left(2.3 + \frac{0.1^2}{2}\right) + \frac{0.1}{\sqrt{21-1}}(-1.998) = 2.2603 \quad (7)$$

$$m^{+} = \left(2.3 + \frac{0.1^2}{2}\right) + \frac{0.1}{\sqrt{21-1}}(2.084) = 2.3516 \quad (8)$$

Since $e^{m^{-}} = e^{2.2603} = 9.586$ and $e^{m^{+}} = e^{2.3516} = 10.502$, a 95% two-sided confidence interval for the population total audit value is the interval from $(1,000)(9.586)$ to $(1,000)(10.502)$, or, from \$9,586 to \$10,502.

If we further suppose that $B = \$10,000$ and $M = \$1,000$, the auditor will conclude that the recorded book amount does not contain material error since $|10,000 - 9,586| < 1,000$ and $|10,000 - 10,502| < 1,000$.

One-sided confidence intervals can be constructed by a similar procedure. Thus, the lower limit of a $100(1 - \alpha)\%$ one-sided confidence interval for the population total audit value is given by Ne^{m_L} , where

$$m_L = \left(\bar{y} + \frac{s^2}{2}\right) + \frac{s}{\sqrt{n-1}}C(s; n-1, \alpha) \quad (9)$$

The upper limit of a $100(1 - \alpha)\%$ confidence interval is Ne^{m_U} , where,

$$m_U = \left(\bar{y} + \frac{s^2}{2}\right) + \frac{s}{\sqrt{n-1}}C(s; n-1, 1-\alpha) \quad (10)$$

$C(\cdot)$ is a factor obtained from tables given by Land (1973, p. 961).

As an illustration, for the data of the example above, $C(0.1; 20, 0.05) = -1.655$, $C(0.1; 20, 0.95) = 1.722$, $m_L = 2.268$, $m_U = 2.343$, $e^{m_L} = 9.660$, $e^{m_U} = 10.418$. Thus, the probability is 95% that the population total audit value is in the interval $(\$9,660 \text{ to } +\infty)$, or in the interval $(\$0 \text{ to } \$10,418)$.

An empirical study of the Land method

If it is reasonable to assume that the population distribution of audit values is log-normal, the Land method enables the auditor to construct exact confidence limits for the population total audit value, that is, limits valid for *any* sample size—small or large. It is, however, unlikely that any

given accounting population can ever be represented *exactly* by an abstract theoretical form like the log-normal. To a practitioner, perhaps the most interesting issue is the *extent* to which procedures appropriate for log-normal populations can be used for accounting populations which are only approximately log-normal.

A comparative simulation study was conducted of the performance of the Land method in samples drawn from some of the Neter and Loebbecke (1975) study populations referred to earlier. The selected study populations were all variants of the N & L Population 3.⁷ The primary measure of interest is the reliability of the Land and other methods, that is, the proportion of confidence intervals actually containing the population total audit value for various sample sizes, error rates and methods. For each given study population and sample size, a random sample of accounts was selected with replacement. Land confidence intervals were constructed as described in the previous section; confidence intervals based on other estimators were calculated according to $\bar{X} \pm U_{\alpha}S(\bar{X})$, as explained in the first section. Each confidence interval was examined to see if it included the known total audit value and the appropriate count was updated. The procedure was repeated 500 times in each case.

It may be worthwhile to point out that, with the exception of Frost and Tamura (1982) who examine a sample size of 50, in all previously published studies of alternative methods for interval estimation large sample sizes are invariably employed. Thus, Neter and Loebbecke (1975) use samples of size 100 and 200; Reneau (1978) examines samples of size 100 to 500 in increments of 100; Baker and Copeland (1979) use samples of size 100 and 200, while Beck (1980) considers primarily samples of size 200 and 600. In view of the extensive documentation available for large sample sizes, the focus of the present study is on two relatively small sample sizes (21 and 51), although larger sample sizes (101, 201 and 501) are also examined for comparative purposes.

Table 1 summarises the principal simulation results, and shows the actual proportions of one-sided upper, one-sided lower and two-sided 90%, 95% and 99% Land confidence intervals containing the population ('true') total audit value, for random samples of size 21 and 51 drawn with replacement from the five Neter and Loebbecke study populations (SP) corresponding to error rates of

⁷The large cost of each simulation run prevented us from examining all N & L populations. Population 3 was selected because it is one of the more highly skewed N & L populations, and because its source—accounts receivable of a medium-sized manufacturer—suggests it may be representative of many accounting populations that auditors encounter in practice. As explained in footnote 4, Population 3 also has the smallest chi-square statistic.

Table 1
Reliability of log-normal confidence intervals, Study Population 3

Error rate	Sample size	Nominal: 90%			Nominal: 95%			Nominal: 99%		
		OSU	OSL	TS	OSU	OSL	TS	OSU	OSL	TS
0.5%	21	87	89	88	93	94	94	98	99	99
	51	88	91	90	94	96	95	99	99	98
1%	21	87	88	88	93	94	94	98	99	99
	51	89	91	90	94	96	95	99	98	99
5%	21	89	87	89	95	93	95	99	99	100
	51	90	88	90	95	94	95	99	98	98
10%	21	92	84	89	96	91	96	99	99	99
	51	94	82	89	97	91	95	99	98	98
30%	21	96	75	86	97	86	93	100	97	99
	51	98	67	78	99	78	87	100	95	97

Key: OSU = one-sided upper; OSL = one-sided lower; TS = two-sided.

0.5, 1, 5, 10 and 30%. Thus, for example, in 89% of the 500 simulated random samples of size 21 drawn from SP3(0.5%), the one-sided lower limit 90% confidence interval constructed according to the Land method contained the population total audit value.

A careful inspection of Table 1 will show that in general the performance of the Land method appears to be fairly good, except for the somewhat erratic results concerning the 90% and 95% confidence intervals at the higher error rates (10% and 30%). A possible explanation may be the relatively high proportion of accounts having 100% error in these study populations. As mentioned earlier (footnotes 3 and 5), accounts with zero audit values may create an awkward problem since the logarithm of a zero audit value does not exist. In the simulations of this study, accounts with \$0 audit value were changed to a \$1 audit value. We believe it is possible that the reliability of the Land method is affected by the presence of a relatively large number of such accounts.⁸ On the other hand, the performance of the Land method is especially good in the study populations having low error rates (0.5, 1 and 5%): all but 3 of the 54 reliability figures shown in Table 1 for these error rates are within ± 2 percentage points from the nominal levels.

Of the three types of confidence intervals, the one-sided upper-limit is usually of special interest to auditors. For this reason, we have further investigated the performance of such confidence intervals based on the Land method and compared it with that of confidence intervals based on the mean-per-unit and two 'auxiliary information'

(the difference and ratio) estimators, for samples of size 21, 51, 101, 201 and 501.⁹ The simulation results for selected populations are summarised in Tables 2 to 4.

Of all methods, the one based on the mean-per-unit estimator appears to be the worst, a conclusion reported in other studies as well. The Land method is clearly better than other estimators at smaller sample sizes (21 and 51). Although the performance of the auxiliary information estimators does not appear to be poor—especially for larger sample sizes at higher error rates—the Land method appears to perform best overall, particularly at lower error rates.¹⁰

Behaviour of the Land limits

The principal criterion for judging the performance of an interval estimator is its reliability (see, for example, Reneau, 1978, p. 673). A '95% confidence interval', for example, should contain the population characteristic in 95% of the samples, not 90% or 99% (in the latter case, the method is not

⁸The number of accounts in the five study populations 3 having \$0 audit values is 5 for SP2 (0.5%), 12 for SP3 (1%), 74 for SP3 (5%), 161 for SP3 (10%), and 479 for SP3 (30%).

⁹The precise definition of these estimators and intervals can be found in Neter and Loebbecke (1975, Chs. 3–5). Two other auxiliary information estimators (the combined mean-per-unit/difference and combined mean-per-unit/ratio estimators) were also investigated, but their performance turned out to be nearly identical to that of the mean-per-unit estimator and it is not reported. It is interesting to note that for the populations under study, Neter and Loebbecke's results for ratio and difference estimators under simple random sampling are actually better than those under stratified sampling. See Neter & Loebbecke (1975, pp. 154–5, 200–1, 208–9 and pp. 164–5, 216–7, 224–5).

¹⁰The DUS Limit based on the Anderson-Teitlebaum (1973) method is known to be conservative. For the range of sample sizes and the study populations covered in this simulation, the DUS limits include the true audit value in 100% of the samples for all three nominal levels. In areas where comparisons could be made, our simulation results were consistent with those of Neter and Loebbecke (1975).

more reliable, but rather more conservative). The precision of the interval is a secondary criterion for choosing among equally reliable estimators. Land's is the only available reliable method in the case of log-normal populations; and, as shown earlier, it appears to be more reliable than other

methods in the case of approximately log-normal populations.

As indicated by equations (3), (4), (9) and (10), the Land limits depend on the unique combination of the mean and variance of the logarithm of audit values as well as the sample size and the nominal

Table 2

Comparison of reliability of Land and other methods for upper confidence limits, Study Population 3, error rate 0.5%

Nominal level:	90%					95%					99%				
Sample size:	21	51	101	201	501	21	51	101	201	501	21	51	101	201	501
<i>Method:</i>															
Land	87*	88*	89*	88*	88*	93*	94*	93*	94*	93*	98*	99*	98	98*	99*
Mean per unit	60	69	74	81	83	63	73	78	87	87	70	80	86	92	94
Difference	100	99	99	99	98	100	100	100	100	100	100	100	100	100*	100
Ratio	98	96	97	97	97	98	97	98	99	99	98*	99*	99*	100*	100

*Indicates that the proportion is closer to the nominal level compared to the other estimators (a tie in a few cases).

Table 3

Comparison of reliability of Land and other methods for upper confidence limits, Study Population 3, error rate 5%

Nominal level:	90%					95%					99%				
Sample size:	21	51	101	201	501	21	51	101	201	501	21	51	101	201	501
<i>Method:</i>															
Land	89*	90*	93	94*	96	95*	95*	96	97*	99	99*	99*	99*	100*	99*
Mean per unit	60	69	74	81	82	63	73	78	87	87	70	80	86	92	94
Difference	99	98	98	97	95	100	99	99	99	99	100	100	100	100*	100
Ratio	88	92	92*	94*	91*	91	94	95*	97*	96*	94	97	98	98	99*

*Indicates that the proportion is closer to the nominal level compared to the other estimators (a tie in a few cases).

Table 4

Comparison of reliability of Land and other methods for upper confidence limits, Study Population 3, error rate 10%

Nominal level:	90%					95%					99%				
Sample size:	21	51	101	201	501	21	51	101	201	501	21	51	101	201	501
<i>Method:</i>															
Land	92*	94	95	97	99	96*	97*	97*	99	99	99*	99*	99*	100*	100*
Mean per unit	60	69	74	81	83	63	73	79	87	88	70	80	86	92	94
Difference	98	97	95	95	95	100	99	98	98	98	100	100	100	100*	100*
Ratio	84	87*	86*	91*	89*	87	91	92	95*	94*	92	95	97	97	98*

*Indicates that the proportion is closer to the nominal level compared to the other estimators (a tie in a few cases).

Table 5
A sensitivity analysis of the Land upper confidence limits*

	$\sigma = 0.10$		$\sigma = 0.50$		$\sigma = 1.00$		$\sigma = 2.00$	
	$\alpha = 90\%$	$\alpha = 95\%$	$\alpha = 90\%$	$\alpha = 95\%$	$\alpha = 90\%$	$\alpha = 95\%$	$\alpha = 90\%$	$\alpha = 95\%$
$n = 21$	2.81	2.84	3.64	3.85	6.84	7.95	77.04	127.94
$n = 51$	2.78	2.80	3.41	3.52	5.74	6.21	42.48	54.56
$n = 101$	2.77	2.78	3.31	3.38	5.31	5.59	33.14	38.82
$n = 201$	2.76	2.76	3.24	3.28	5.04	5.21	28.25	31.34
$n = 501$	2.75	2.75	3.18	3.21	4.82	4.92	24.75	26.34
Log-normal population mean audit value, $\exp(\mu + \sigma^2/2)$	2.73		3.08		4.48		20.09	

*Mean of the Logarithm of Audit Values, $\mu = 1$; Standard Deviation of the Logarithm of Audit Values, $\sigma = 0.1, 0.5, 1.0$ and 2.0 .

confidence level. Table 5 provides a sensitivity analysis on the Land upper limits for different levels of the variance, sample size and confidence, with the mean equal to one. These limits were computed using equation (10) and replacing the sample estimates, $\bar{y}$ and s , by their respective population parameters, μ and σ .¹¹ Since the sample estimates are expected to fluctuate around their corresponding population values, limits computed on the basis of sample estimates are expected to fluctuate around the limits given in Table 5 for the respective sample sizes and confidence levels.

From Table 5, it is observed that for a given μ , σ and α , the limit decreases as the sample size increases, and it converges toward the population mean audit value (or equivalently the population total audit value when multiplied by the population size). As the sample size decreases and as the variance increases, the limits become more conservative. This is a behaviour common to other estimators as well.

Conclusion

It has been observed that accounting populations possess special characteristics which often render the application of 'standard' statistical methods inappropriate. This is particularly true when the audit population is skewed and when the sample size is small. Although there can obviously be no guarantee that all accounting populations are log-

normal, available empirical evidence and *a priori* reasoning suggest that many accounting populations follow a log-normal distribution. Economic considerations often make small samples necessary, despite their inherent imprecision. The method introduced in this paper should therefore be considered as a viable alternative to standard techniques in constructing reliable confidence limits for the total audit value.

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¹¹For example, if $\mu = 1$, $\sigma = 0.50$, $n = 51$, $\alpha = 0.90$, the Land upper limit for the population mean is $\exp[(1 + 0.25/2) + (0.5 \cdot 1.43/\sqrt{50})] = 3.41$. Table 5 provides the Land limits for $\mu = 1$. For $\mu \neq 1$, the limits and the population mean audit values will be proportional to those in Table 5. For example, if $\mu = 3$, $\sigma = 0.50$, $n = 51$, $\alpha = 0.90$, the Land upper limit will be $e^{(3-1)} \cdot \$3.41$ or \$25.20, with the population mean audit value being $e^{(3-1)} \cdot \$3.08$ or \$22.76.

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Professional Commitments of the Practising Chartered Accountant in Modern Britain*

Roger Groves, Michael Poole and Paul Broder

Introduction

In recent years, there has been a great deal of interest in the growth of professional associations and in the variety of procedures through which professional status is accredited and maintained. Surveys have been periodically conducted of such groups as medical and legal practitioners (Kelsall, 1955), bishops and leading members of the Church of England (Stanworth and Giddens, 1974), teachers (Floud and Scott, 1961; Noble and Pym, 1980) and managers (Poole, Mansfield, Blyton and Frost, 1981). Amongst accountants, however, although there are some pointers to key characteristics (see Aranya, Pollock and Amernic, 1981; Belkaoui, 1981; Hickson and Thomas, 1969; Portwood and Fielding, 1981; Hastings and Hinings, 1970; Poole and Groves, 1982), many aspects of professionalism have still to be adequately investigated.

The objective of this paper is to examine the commitments of English and Welsh chartered accountants to professionalism and, in particular, to their institute, the Institute of Chartered Accountants in England and Wales (ICAEW), with a view to isolating some of the main processes involved in upholding professional norms and codes of conduct. Data are presented from a national survey of chartered accountants working in professional offices in England and Wales. The population was sampled in a way that ensured that the subjects under investigation were reasonably homogeneous. In 1980, a pilot study was conducted in Cardiff with questionnaires being sent to a number of chartered accountants working in the profession. After redrafting, in June 1981, questionnaires were posted to 2200 members of the Institute drawn systematically from a random starting

point, and selected from the ICAEW list of qualified employees, partners or sole practitioners. The overall response rate (30%) was typical for this type of investigation, and in terms of absolute numbers (660) is more than adequate for the themes of this study.

An attempt was made to test response bias using the attribute of date of birth (the only characteristic on which there was adequate information). The null hypothesis, that the respondents' mean age was the same as that of the sample, could not be rejected at the $\alpha = 0.05$ level. In this respect, then, the respondents reflected the sample and, since this was a systematic random sample, there were strong grounds for assuming that it should, in turn, reflect the membership as a whole.

Theoretical considerations

There is now a substantial body of literature on professions and professionalism (see e.g. Carr, Saunders and Wilson, 1933; Millerson, 1964; Wilensky, 1964; Elliott, 1972; Johnson, 1972; Saks, 1983). Broadly speaking, however, it is possible to identify two main approaches to their study: (1) the taxonomy of key attributes resting 'on the tenet that professions both possess some unique characteristics which set them apart from other occupations and play a positive and important role in the division of labour in society' (Saks, 1983: 2); and (2) historically informed, critical analyses of the rise of professional groups and of their strategies to maintain a privileged social position. Moreover, the first approach can be subdivided into the trait and functionalist models of professions and professionalism. These involve either the isolation of key attributes or, alternatively, highlighting elements viewed to be functional to the social system or to professional-client relations (for a detailed review, see Saks, 1983).

Our research design is based on a modified 'trait' approach. This can be originally traced to Carr-Saunders's and Wilson's (1933) classical study and later to Greenwood (1957), who isolated the char-

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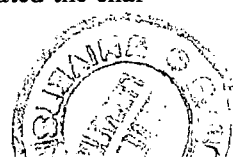


Figure 1**Occupation-Profession Model**

<i>Characteristics</i>	<i>Occupation</i>	<i>Amount of Characteristic Present</i> <i>Profession</i>
1. Theory, intellectual technique	Absent	Present
2. Relevance to social values	Not relevant	Relevant
3. Training period		
A	Short	Long
B	Non-specialised	Specialised
C	Involves things	Involves symbols
D	Subculture unimportant	Subculture important
4. Motivation	Self interest	Service
5. Autonomy	Absent	Present
6. Commitment	Short-term	Long-term
7. Sense of community	Low	High
8. Code of ethics	Undeveloped	Highly developed

Source: R. M. Pavalko, *Sociology of Occupations and Professions*, Illinois, Peacock, 1971, p. 26

acteristics that distinguish a profession from other types of occupation:

- (1) A basis of systematic theory.
- (2) Authority recognised by the clientele of the professional group.
- (3) Broader community sanction and approval of this authority.
- (4) A code of ethics regulating relations of professional persons with clients and with colleagues.
- (5) A professional culture sustained by formal professional associations.

He also pointed out that occupations in society are distributed along a continuum and that, therefore, there is no clear-cut distinction between a profession and a non-profession. Barber (1963) proposed that professional behaviour only comprised four elements; generalised knowledge, primary orientation to the community interest, internalised code of ethics, and rewards which primarily symbolise work achievement. Again, Millerson (1954) isolated five characteristics, which were similar to those of Greenwood listed above, and which are of a rather general nature. However, within each sub-heading it is possible for more specific elements to be elicited. For instance, Hickson and Thomas (1969) identified a series of such professional attributes: these were skill based on theoretical knowledge, required education and training, competence tested, organised, adherence to a code of conduct, altruistic service, applied to affairs of others, indispensable public service, licensed community sanction, definite professional-client relationship, fiduciary client relationship, best impartial service given, loyalty to colleagues and definite compensation.

Importantly, Hickson and Thomas also recognised that there is, in effect, a profession-occupation continuum and that considerable variations

can be observed for the different attributes between different professions and between associations and members within given professions. The occupation-profession model of Pavalko (1971) provides a particularly valuable illustration of this point (see Figure 1). To be sure, the Pavalko model does not enable us to determine the relative importance of each of the characteristics, but it does give an indication of which types of characteristic should be present in a profession as well as of the 'ideal-typical' elements at the extremes of the continuum. Nevertheless there is still the difficulty of trying to quantify the amount of any characteristic present, and that of endeavouring to place a particular type of employment at an appropriate point on each dimension.

Professional characteristics of chartered accountants

The extent to which chartered accountants manifest the above characteristics will now be discussed in more detail. Indeed, the principal purpose of this paper is to deploy a number of the dimensions of professionalism and to see how far these relate to the experiences of chartered accountants working in private practice. For operational purposes we have condensed and amended the attributes discussed above and use the following six groupings as a basis for our investigation:

- (1) Theory, intellectual technique, period of training and the testing of competence.
- (2) A code of ethics monitored by the ICAEW.
- (3) A service motivation with emphasis on independence and autonomy in dealing with clients.
- (4) Job attitudes reflecting the extent and method of commitment and the concern for independence.

Table 1
Educational Background and Qualifications of Chartered Accountants
 (percentages: total respondents N = 660)

<i>Type of school attended</i>	Grammar/Technical 58.7	Independent 31.7	Comprehensive 2.7	Secondary Modern 4.1	Scottish School 0.3	Overseas School 2.5
<i>Type of university attended</i>	Oxbridge 2.5	Other University 14.8	Polytechnic 0.3	Institute of Higher Education 0.6	Other 0.5	No Degrees 81.3
<i>Mix of first degree subjects studied by graduates</i>	Pure Science 19.7	Applied Science 9.0	Social Science (Relevant) 41.8	Social Science (Non-relevant) 11.5	Humanities 10.6	Other 7.4
<i>Percentage of masters degrees/doctorates obtained</i>	Oxbridge 2.3	Other University 1.4	Other 0.2	None 96.1		

- (5) Relevance to social values in terms of the accountants' general role in society.
- (6) A sense of community in leisure attributes and activities, and a pattern of informal association and behaviour carried over from work into 'non-work' activities.

Theory, intellectual technique, education and training and the testing of competence

In the bulk of definitions for a profession, a high level of education and training and the testing of competence of practitioners by their respective associations have almost invariably been identified as signal features. Our examination of the professionalism of chartered accountants thus commences by reference to these themes. The account begins with a discussion of findings from earlier studies and published material. This is followed by a review of relevant data arising from our own investigation.

The ICAEW is an example of what Millerson has termed a Qualifying Association, which is technically distinguished from Prestige, Study and Occupational associations on the ground that 'such a body aims to examine and qualify individuals wishing to practise in the subject. This additional objective vastly expands the role of an association, giving it a key position in the system of professional organisations' (Millerson, 1954, p. 37-38). This central function of the ICAEW has been amplified by Hastings (1969), as part of his enquiry into the professional socialisation of individuals into accountancy. He provided full evidence of the amount of basic theory, the educational process, the training and the testing of

competence necessary for an individual to qualify as a chartered accountant.

Current changes in progress that impinge upon the type and quality of training given to ICAEW student accountants and which affect syllabuses and examinations should be mentioned. For example, between 1965 and 1976 the percentage of student registration with the large firms (14+ partners) rose threefold. Moreover, the form of student intake has changed in the past fifteen years, with graduate trainees now being the main source of student accountants. Indeed, 67% of trainees registering in 1979 were graduates, and the forecast is that this will rise to approximately 90% in 1984 (it was only 9% in 1964).¹

Our own findings focussing on members themselves revealed wider educational experience as well as a tendency for the new recruits into the profession to be increasingly graduates. Respondents were asked for demographic details, which are reproduced in more detail in a recent article in *Accountancy* (Poole and Groves, 1982). The main findings are set out in Table 1 where it will be noted that accountants appear to be predominantly educated at either independent or grammar or technical schools. A further breakdown of the data by age revealed that over two-thirds of the respondents who were graduates (nearly 20% in the sample overall) were in the 35 years or under category. It is also interesting to note the substantial proportion of graduates (42%) who had taken degrees in the social sciences relevant to accountancy.

In the first category of professionalism, then, our

¹All the above statistics were taken from an ICAEW Working Paper entitled 'Career Development in the Practising Office,' 1980.

data support other findings of a high level of education of chartered accountants. To be sure, it was not the authors' intent to enquire too deeply into this group of elements since it was felt that proof of the training, background, theory, intellectual technique and testing of competence of chartered accountants had been provided elsewhere (cf. Hastings, 1969). But our evidence underscores the significance of this group of characteristics as an increasingly important element of professionalism.

A code of ethics monitored by the ICAEW

Of the various characteristics of a professional association, the commitment of the membership to a code of ethics and to the maintenance of professional standards are amongst the most significant. Indeed, to illustrate the importance placed on such codes by the Institute, the Guide to Professional Ethics (Section 1.2) in the Members' Handbook comes immediately after the details of the Charter and Byelaws. However, there are inherent difficulties in attempting to assess to what extent a code of ethics can be said to exist in a given professional group, not least because the formal codes may reveal very little about actual working practices. Ethics may be understood as a set of norms which are absorbed as part of the professional socialization process, which takes place mainly during the training period. Nevertheless, at least in the accountancy profession, the rules are rarely discussed because of the high degree of consensus, which arises not only from training, but also from 'taken-for-granted' assumptions about actual behaviour in work itself.

But what happens at those times when consensus breaks down internally or is put under attack by external sources? Do members accept the moral obligations of acting within the guidelines set out by the Institute, or is it necessary (and thus much less professional) to make these guidelines legally binding? After all, moral acceptance of the professional codes, i.e. the standards, rather than the need for legal enforcement, enhances the claim for professionalism since the model hypothesises that professionals have a highly developed sense of duty and obligation to a code of ethics. Up until the present there has not been a move to the enactment of guidelines; rather the Institute has tried to ensure adherence through its own disciplinary procedures. In 1981, there was less than one in a thousand members involved in disciplinary cases (some of the problems were very minor such as nonpayment of subscriptions) which indicates either that there is a very high adherence to the codes of conduct or that these are merely a facade and not considered sufficiently important to merit disciplinary sanctions at all. However, because the code of ethics does not specifically relate to breaches of

the statements on standard accounting practice by members, it was decided to obtain views on this issue. By a series of questions it was hoped to determine whether a response pattern would emerge reflecting an internalised code. Hence respondents were asked whether pronouncements by the professional bodies should be either legally or morally binding. Their attitudes are set out in Table 2, in which a 7 point scale is used to show the level of strong agreement (7), indifference (4), and strong disagreement (1) over various issues. It shows that over 70% of the respondents *agree* to a greater or lesser extent that professional body announcements should be morally binding, and that 59% to a greater or lesser extent *disagree* with them being legally binding.²

Table 2 also indicates the feelings of members as to the treatment that should be accorded to fellow members should they or their firm breach an accounting standard. When members breach the standard neither a fine nor expulsion seems the appropriate penalty to the majority of those responding, though a majority did feel there should be some punishment. The feelings against punishment were stronger when the breach was by the firm for which the member worked. This is to be expected because although members can often influence what occurs in their firm, they cannot always be held to be primarily responsible for its actions. It is, therefore, understandable that the respondents were uncertain whether or not they should be held accountable in such circumstances.

Respondents were also asked about the *penalties* which they thought appropriate in the event of a breach of an accounting standard by an individual member. Two situations were again examined, firstly, where the member himself was responsible for the breach; and secondly, where the firm employing the accountant was responsible. For each situation respondents were asked to indicate their feelings on a scale of 1 (strongly disagree) to 7 (strongly agree) on each of the following mutually exclusive actions: (1) a fine, (2) expulsion from the Institute, and (3) no punishment.

In order to discover the extent to which the responses could be combined to indicate an overall set of professional attitudes, the correlations between items were examined. The correlations between the answers to the six questions are given in Table 3 below. The figures show a significant set of inter-correlations, if not an immediately discernible pattern of interpretation.³

²Using two single tail z tests with a null hypothesis of indifference for each question, i.e. $H_0: \mu = 4$, and for (a) $H_A: \mu < 4$ and (b) $H_A: \mu > 4$, Table 2 shows that at the 1% level we can reject the null hypothesis for both questions.

³Bartlett's test on the correlation matrix gave a χ^2 value of 1078.7 which greatly exceeded the tabulated value of 32.8 at $\alpha = 0.05$ for 15 degrees of freedom.

Table 2
Frequency Distribution of the Professional Attitudes of the
Chartered Accountant (percentages)

	<i>Strongly disagree</i>					<i>Strongly agree</i>					
	1	2	3	4	5	6	7	N	Mean	Standard deviation	
<i>Pronouncement by professional bodies should be:</i>											
(a) legally binding	36.4	11.4	11.1	14.0	9.4	7.0	10.7	615	3.13	2.10	
(b) morally binding	7.4	1.5	3.3	14.7	17.9	22.7	32.5	620	5.32	1.75	
<i>Breachings of standards by member responsible should be punished by:</i>											
(a) a fine	33.9	7.8	7.3	15.9	12.9	9.8	12.4	510	3.45	2.19	
(b) expulsion from the Institute	48.0	12.0	6.8	11.4	7.9	6.0	7.9	484	2.68	2.04	
(c) no punishment	38.1	7.4	3.4	17.3	9.0	6.3	18.5	475	3.45	2.34	
<i>Breachings of standards by the firm should involve punishment regardless of position by:</i>											
(a) a fine	54.2	6.9	6.5	13.4	6.5	5.1	7.4	491	2.56	2.02	
(b) expulsion from the Institute	71.1	8.0	5.0	8.4	2.4	2.0	3.0	463	1.82	1.54	
(c) no punishment	31.2	5.5	3.2	11.4	6.9	8.3	33.5	507	4.16	2.54	

Table 3
Correlation Coefficients Between Attitudes on Breaches
of Standards

	MEMBER			FIRM		
	<i>Fine</i>	<i>Expulsion</i>	<i>No Punishment</i>	<i>Fine</i>	<i>Expulsion</i>	<i>No Punishment</i>
MEMBER						
Fine	1.00000	0.45271	-0.56395	0.60433	0.25193	-0.29861
Expulsion		1.00000	-0.42155	0.29815	0.56149	-0.21993
No Punishment			1.00000	-0.29904	-0.16909	0.63932
FIRM						
Fine				1.00000	0.50168	-0.41256
Expulsion					1.00000	-0.25699
No Punishment						1.00000

In order to establish the underlying structure of respondents' attitudes, factor analysis was used to investigate these relationships further.⁴ The results are presented in Table 4 where it will be seen that factor one has significant loadings for variable one, three and six (three and six relate to the questions which asked if no punishment was the appropriate response for an individual breach of an accounting standard and a firm breach of an accounting standard). Variable one (based on whether a fine is

the appropriate punishment for an individual breach) has a negative loading when compared to the loadings for variables three and six. Hence

Table 4
Factor Analysis of Attitudes to Penalties
for Breaches of Standards: Final Solution

	<i>Factor 1</i>	<i>Factor 2</i>
MEMBER		
1 Fine	-0.52656	0.43237
2 Expulsion	-0.29999	0.56002
3 No Punishment	0.99291	-0.11540
FIRM		
4 Fine	-0.33122	0.59738
5 Expulsion	-0.05014	0.82447
6 No Punishment	0.57015	-0.23048
Criterion for significant loadings 0.4		

⁴The direct method of factor analysis used was SPSS principal components analysis with iteration. Then, in an attempt to achieve a Thurstone type of simple structure, a derived solution was obtained from the initial configuration by using Varimax rotation. This greatly simplified the factor loadings. The Varimax rotated solution is based on 425 cases since not all respondents answered each of the six questions.

Table 5
Respondents' Attitudes to the Institute of Chartered Accountants

	<i>Strongly disagree</i>		<i>Indifferent</i>			<i>Strongly agree</i>		<i>Total</i>	<i>Mean</i>	<i>Standard deviation</i>
	1	2	3	4	5	6	7			
Are professional associations like the Institute of Chartered Accountants necessary for the well being of accountancy?	7	2	9	51	104	166	311	651	6.04	1.20
If you did not need to pay your annual subscription to retain your professional qualification, would you continue paying the subscription and stay a member of the Institute?	Yes		Probably			No				
	325		244			82		651		

those respondents who thought that no punishment was *not* the appropriate response in both situations also thought that a fine was the appropriate response and vice versa.⁵

Factor two has significant loadings for variables one, two, four and five. These four variables are concerned with specific types of punishment and all load in the same direction. In principle this could be interpreted as indicating that the respondents are either all in favour of severe punishments or all against severe punishments. But it is clear from Table 2 that only mild punishments are thought appropriate and that there is a very large proportion against severe punishment, especially expulsion for a firm's breach. Hence, the results seem to indicate that even where overt action is thought appropriate only mild forms of punishment are favoured.

Obviously a code of ethics produced by the Institute is only going to be supported by members if they have a belief that their professional association is necessary and is performing its functions well. To assess this further issue, therefore, two main items were focussed on, and the results are given in Table 5. The first question was concerned with how necessary is a professional association such as the ICAEW. The members answered overwhelmingly in the affirmative with 89% registering approval of some kind. But it has been suggested that the ICAEW does not satisfy all the needs of its diverse membership and to investigate that feeling the membership were further asked if they would continue their financial support once it became unnecessary to pay a subscription to retain

the professional qualification (the required hallmark of a practising accountant). Half would definitely pay but 38% were not sure; it would obviously depend on the situation. These data further reinforce the findings in this section that the degree of professional commitment to a code of ethics monitored by the ICAEW would appear to vary substantially depending on the issue concerned.

A service motivation with emphasis on independence and autonomy in dealing with clients

As Pavalko and others have claimed, a profession would be expected to have a service motivation with considerable autonomy being present in actual encounters between practitioners and clients. Certainly the accountancy profession has always placed an emphasis on service coupled with autonomy and integrity and long-term commitment. But, is that still the perceived role and contribution of the chartered accountant in today's society?

In order to assess the current situation, respondents were asked to indicate the importance they attached to various elements that reflected a service motivation and appropriate conduct in dealing with clients. Four of these attributes (listed in Table 6) were derived from the pilot enquiry and subsequently used in the main investigation. All members of the sample were also invited, in an open-ended question, to state which characteristics in the role of chartered accountants were most important to them.

It is clear from the results presented in Table 6 that respondents considered that the provision of an efficient and professional service on business matters, independent reporting by experts, honesty, integrity and business confidence, and improving business efficiency and growth to be highly important elements in their professional

⁵We can say vice versa because of the figures in Table 3. These indicate a high level of disagreement amongst the respondents. Therefore, this first factor can be interpreted as being a measure of the attitude towards whether overt punishment is an appropriate response in the event of a breach.

Table 6
Evaluation of Elements in the Role and Contribution of the Chartered Accountant in Modern Society

	<i>Not important at all</i>				<i>Very important</i>			N	Mean	Standard deviation
	1	2	3	4	5	6	7			
1. To provide an efficient professional service on business matters	2	0	3	11	43	108	460	627	6.6	0.788
2. Independent reporting of experts	5	5	14	78	119	132	273	626	5.9	1.279
3. Honesty, integrity and business confidence	2	0	2	16	43	71	493	627	6.6	0.799
4. Improving business efficiency and growth	6	8	23	78	136	121	254	626	5.7	1.346

role. Indeed, the very high means and low standard deviations in each case are worthy of mention. Moreover, these findings are reinforced by the rankings presented in Table 7, derived from responses to the open-ended question. To be sure, it is possible that the result here is a little biased, since respondents had already answered the question on which the data in Table 6 are based. But the evidence strongly supports the hypothesis of the chartered accountants' perception of their role of providing an efficient confidential, professional service on business matters with honesty, integrity and independence. These perceptions, too, clearly reflect professional rather than occupational modes of conduct.

Job attitudes reflecting the extent and method of commitment and the concern for independence

In a profession, it is to be expected that views on actual work tasks should also reflect a high degree of commitment and a concern for autonomy and independence. To test this, a shortened version of a questionnaire designed by Porter (1961) was incorporated in our investigation. His questions enable information to be elicited on various items relating to the different 'need' areas identified by Maslow (1954).

Table 8 sets out the job characteristics and uses three main dimensions for an assessment. These

Table 7
Perception of Important Items in Role and Contribution of Chartered Accountants

<i>Items</i>	(Percentage of votes for each ranking)				<i>Total Votes</i>
	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	<i>4th</i>	
1. Provision of an efficient and professional service on business matters	34.9	21.5	16.0	4.0	397
2. Honesty, integrity and business confidence	24.7	27.1	19.6	6.7	382
3. Independent reporting by experts	8.9	14.1	21.4	51.2	373
4. Improving business efficiency and growth	7.8	15.4	29.8	35.6	354
5. To give general advice	9.7	6.4	4.8	0.3	111
6. Provision of an objective, independent, logically based point of view	3.6	2.8	1.5	—	42
7. Audit and accountancy duties, including protection of third party interests	2.2	3.2	2.5	0.6	41
8. General advice on taxation	2.1	4.3	1.5	0.6	41
9. Being an important link between government and business	1.3	2.6	0.8	0.6	25
10. Provision of a business service	1.7	1.9	1.0	—	24
Miscellaneous	3.1	0.7	1.1	0.4	
	100%	100%	100%	100%	
Total votes	631	469	393	326	

Table 8
Assessment of Job Characteristics

Characteristics	Extent to which a characteristic is present (a)	Extent to which a characteristic should be present (b)	Importance of a characteristic (c)	Deficiency in presence of characteristic (b) - (a)	Measure (b - a)c
Opportunity for independent thought and action	5.8	6.2	6.2	0.4	2.5
Security	5.5	5.9	5.7	0.4	2.3
Pay	5.0 ^{1,2}	6.0	5.5	1.0	5.5
Opportunity for personal growth and development	4.9 ²	5.7	5.5	0.8	4.4
Scope for feelings of self-esteem	5.0 ¹	5.4	4.9	0.4	2.0
Opportunity to develop close friendships	4.3	4.6	4.1	0.3	1.2
Promotion opportunities	3.3	4.0	3.7	0.7	2.6

Columns a, b, c—Mean scores based on 7-point scales 1 = Minimum, 7 = Maximum. Within columns a, b, c, separately, a pairwise comparison of means was undertaken to substantiate the ranking of the characteristics listed. All pairs of means tested were statistically significant at the $\alpha = 0.01$ except for two pairs, each indicated with a common superscript, (1 and 1), (2 and 2). These two pairs marked were not significantly different at the $\alpha = 0.05$ level either.

The mean score differences listed in column 4 are all statistically significant at $\alpha = 0.01$ level.

dimensions are (i) the extent to which the job characteristic was felt *to be present*, (ii) the extent to which it was felt that the job characteristic *should be present*, and (iii) the *importance* attached to the specific characteristic.

The characteristics are listed in Table 8, based on the mean score attributed to the characteristic being present in the job, and ranked accordingly. (A seven point scale was used for the respondents to provide their views.) It will be seen that opportunity for independent thought is not only the most significant characteristic, but it is rated very close to the maximum. The data also indicate the importance attached to security of tenure by the respondents, as well as the strength of feeling about the need for an appropriate reward through pay. The poor showing of promotional opportunities can be explained by the large number of respondents who were already partners. The opportunity to develop close friends is surprisingly low in the order, given the extent to which the 'old boy' network is perceived to exist in the profession.

Job satisfaction can be partially measured by the deficiency between how much of the characteristic should be in the job and what is actually present (i.e., $b - a$). This is given in column 4 of the table. The differences between mean values presented here are all statistically significant at the $\alpha = 0.01$ level. Pay and the opportunity for personal growth and development appear to be matters for particular concern. This inference is supported by the further measure of job satisfaction in which the $b - a$ scores are multiplied by the importance scores (i.e., $(b - a)c$). It should be remembered that the maximum score for this second measure of deficiency in column five is 49 (somewhat unlikely but possible) and that, therefore, scores of 5.5 and 4.4 are not very high in terms of total dissatisfaction.

Nevertheless, the two areas of dissatisfaction identified are not ones which might have been expected in a professional group. Indeed, the concern over remuneration suggests a certain 'pecuniary' or 'instrumental consciousness' which to some extent runs counter to those commitments identified thus far and in particular to the service mentality suggested by Pavalko and others as a central motivation of members of a profession.

Relevance to social values in terms of the accountant's general role in society

A distinguishing feature of a profession is that its services are thought to promulgate and improve the welfare of society as a whole. In particular, the services provided by a profession are seen to be relevant to the prevailing social values of the community. The stability, over time, of accounting activities in general and of chartered accountants

Table 9
Issues Considered Appropriate for ICAEW to make
Representations to Governments

1. Taxation	31.4
2. Influencing the practical effect of government legislation	23.5
3. Company legislation	12.6
4. Financial issues	12.1
5. Should play a larger part in Government	7.9
6. General criticism of Government	5.2
Miscellaneous	7.3
	100.0
Total number of issues listed	405

in particular, could be said to suggest that this group provide such relevant services. Alternatively, it could be argued that a qualifying association has sufficient power to ensure, through legislation, that it maintains its privileged monopolistic position, thus guaranteeing the importance of its services.

The issue addressed in this section is how relevant to social values did the respondents view their particular activities? To do this we asked members of our sample whether it was felt that the ICAEW should make rather more social and political representations to governments than is currently the case. Further information was elicited on the extent to which it was perceived that professional standing, and social and economic standing, had changed over the previous ten years as seen from three groups of people: the general public, the professional business community, and themselves.

In the first respect the sample was divided almost equally with a small balance of respondents (4%) favouring stronger representations by the ICAEW to governments. An attempt was also made to identify the types of issue over which representation should take place. The results are presented in Table 9 and show, not surprisingly, that the areas of greatest interest are those most closely linked with aspects of the professional task. Clearly a large number of respondents felt that their expertise should be used on financial issues affecting society at large.

Results on the second question are reported in Table 10, where it will be seen that the typical view for all six categories was that no change in the standing of chartered accountants had taken place. But there are some interesting divergences of interpretation amongst those who had a different opinion. Above all, insofar as the perceptions of accountants of their social relevance is concerned, 31% of respondents considered that, in the eyes of the *general public*, their professional standing had declined. These data are consistent with the view

that there should be more representation to governments to promote the views of the profession. Furthermore, 30% of respondents were of the opinion that their *social and economic standing* had declined in the last ten years (reflecting an assessment of how society views the accountant's professional standing).

In short, while accountants clearly believe that their services are relevant to society, at the same time a minority undoubtedly think that their standing in society has declined and that this, in turn, reflects society's judgement on their *professional* activities. On the other hand, in the eyes of the general public and of the professional business community, a slight gain in terms of *social and economic standing* is perceived. Interestingly, then, the overall position of chartered accountants may be improving, even though the degree of professional esteem may be declining. This suggests, too, that the concept of relevance to social values is multidimensional with different interpretations of the degree of professionalism permissible depending on the index used. However, the relatively high degree of stability identified overall is consistent with the notion of continuing relevance to society, a characteristic, in turn, of any major professional group.

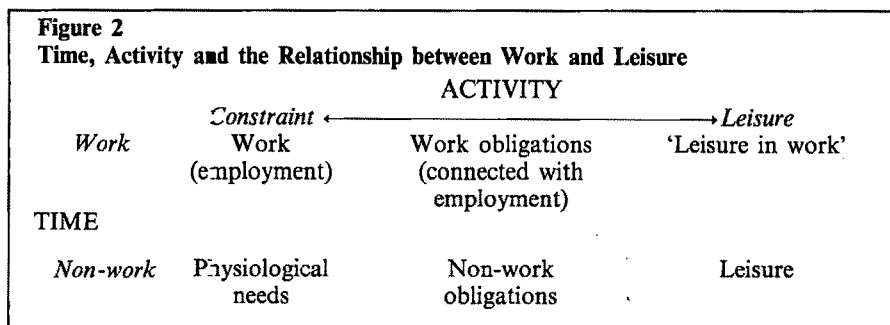
A sense of community in leisure attributes and activities and a pattern of informal association and behaviour carried over from work into 'non-work' activities

Any study of professionalism should not be confined solely to employment activities, because individuals with a high degree of commitment and a sense of community should reflect their professionalism in so-called 'extensional' relationships between work and leisure (Parker, 1971). In these

Table 10 Changes in the Professional and Social and Economic Standing of Chartered Accountants over the Last Ten Years									
Groups									
Position	In the eyes of the general public		In the eyes of the professional business community		In your own estimation				
	Professional standing	Social and economic standing	Professional standing	Social and economic standing	Professional standing	Social and economic standing	Professional standing	Social and economic standing	
	%	%	%	%	%	%	%	%	%
Declined	31.3	16.2	20.9	13.5	23.1	30.3			
No real change	55.9	62.3	53.4	67.0	48.4	52.5			
Improved	12.8	21.5	25.6	19.5	28.6	17.1			

Table 11 Assessments of Characteristics of Out-of-work Activities						
	Extent to which a characteristic is present (a)	Extent to which a characteristic should be present (b)	Importance of a characteristic (c)	Deficiency in presence of characteristic (b - a)	Measure (b - a) ^c	
Opportunity for independent thought and action	5.2 ¹	5.5	5.3	0.3	1.59	
Opportunity to develop close friendships	4.9 ^{1,2}	5.5 ³	5.1	0.6	3.06	
Feeling of self-esteem	4.4 ²	4.8 ⁴	4.6	0.4	1.84	
Opportunity for personal growth and development	4.3	5.0 ³	4.7	0.7	3.29	
Feeling of security	4.2	4.4 ⁴	4.1	0.2 ⁵	0.82	

Columns a, b, c—Mean scores based on 7-point scales 1 = minimum, 7 = maximum.
Columns a, b—Within each column of means a pairwise comparison of the means was undertaken to substantiate the ranking of the characteristics listed. Each pair of means found significantly different from each other at the $\alpha = 0.05$ level was marked with a common superscript only, (1 and 1), (2 and 2) in column a, and (3 and 3) and (4 and 4) in column b.
Column 4—All the mean score differences listed in this column are significant at $\alpha = 0.05$ and 0.01 levels (except for the one marked 5).



relationships there is a lack of demarcation between work and leisure and, indeed, considerable activity usually takes place in both spheres. Parker (1971, p. 28) has further identified the dimensions of time and activity as a way of portraying the relationship between work and leisure and the grey area in between (see Figure 2)

The division between work and non-work time for a member of a profession is typically blurred. Thus, on the basis of the Parker (1971) model, members of a profession providing a service would be expected to participate to quite a high degree in work obligations, leisure in work, and physiological needs areas. Above all, however, an active leisure pattern complementing rather than de-

tracting from the career and employment experiences would be hypothesised.

For a first test, a modified version of the Porter questionnaire was again used with a seven-point scale to determine the characteristics of the out-of-work activities. The results are tabulated in Table 11 and indicate a high level of commitment and involvement—something that is referred to in Table 12 as well. The experiences in work tasks seem to have been extended into leisure activities with the need for independent thought and action being rated particularly highly. Furthermore, the respondents seemed generally to be very satisfied with their out-of-work activities as measured by the very low scores in the fourth and fifth columns.

Table 12
Membership, Participation and Administrative Roles in Leisure Groups

Type of group	No. of memberships	Percentage participation in at least a moderate amount %	Percentage taking administrative role %
<i>Professional groups</i>			
1. Accounting societies other than ICAEW local society	28	64.3	25.0
2. Business groups (BIM, CBI, etc.)	68	83.8	50.0
3. Business groups (social/charitable organisation—Round Table, Rotary, etc.)	108	84.3	42.6
	—		
<i>Social and Cultural</i>			
1. Charities (including religious)	180	90.0	73.9
2. Community, social work activities	97	85.6	100.0
3. Personal social and cultural activities	258	68.2	27.5
	535		
	—		
<i>Sporting and Physical</i>			
1. General	600	67.0	24.3
	600		
	—		

The amount and form of participation in leisure activities was also requested, and it was hypothesised that not only would activity level be high, but so would the degree of commitment. Again, it was considered likely that the activities would be basically extensional in type. Information was thus obtained on membership of formal groups, societies, and so on, and the participation level was ranked on a 0 (none) to 5 (most) scale. Participation was defined as attendance at meetings, functions or the use of facilities. Respondents were also asked if they had an active administrative role as well (e.g. chairperson, treasurer, etc.)

It was found that a significant minority belonged to business groups such as the British Institute of Management, the Confederation of British Industry, Rotary and Round Table. Moreover, they participated actively, with over 80% of the members feeling that they attended at least a moderate amount (indeed, in excess of 50% reported that they were present at a lot or most of functions). Many were also office holders. In social and cultural affairs, attendance was also high, with all respective members taking an active role in social and community work. Participation also appears to be above average in the personal, social, sporting, and physical activities sections where again a significant minority had taken on an administrative role.

In sum, then, this evidence shows that practising accountants spend considerable time on work related activities and leisure in work activities—a sign of an extensional relationship. Notwithstanding the reduction in non-work time occasioned by these activities, they are also heavily committed in the areas related to physiological and leisure needs. Given certain limitations to our measures, it is clear that English chartered accountants score highly on this dimension of professionalism and are undoubtedly very active in areas not immediately connected with actual work tasks themselves.

Conclusions

The objective of this paper has been to assess, on the basis of a number of professional traits, the extent to which English chartered accountants may be said to conform to the various norms and practices of professionalism. To this end, data were marshalled from a large scale national sample of chartered accountants working in professional offices in England and Wales. After examining various theories and dimensions identified in the literature, the following attributes were investigated: theory, intellectual technique, period of training and the testing of competence; a code of ethics and views on the monitoring role of ICAEW; a service motivation with emphasis on independence and autonomy in dealing with clients; job attitudes reflecting the extent of commit-

ment in employment and a concern for independence in a work milieu; relevance to social values in terms of the accountants' general position in society; and a sense of community in leisure activities.

The pattern which ultimately emerged was undoubtedly highly complex with respondents seemingly displaying different degrees of professionalism on each of the various characteristics. In respect of theory, intellectual technique, period of training and the testing of competence, it is clear that there is currently a major change in progress, a situation reflected most obviously in the substantial increase in the number of graduates who are becoming accountants. Moreover, the nature of the ICAEW as a qualifying association, coupled with the trend towards an increasingly graduate entry, are undoubtedly indicators of a fairly high degree of professionalism on this particular dimension.

Insofar as a code of ethics monitored by the ICAEW is concerned, however, a rather different set of findings emerged. The preference for a morally rather than legally binding status to the Institute's pronouncements is consistent with a professional commitment. Nevertheless, in terms of punishments for breaches of standards, there was no homogeneity of view and, although bodies such as the ICAEW were considered to be necessary for the well-being of accountancy, our respondents' support for their own professional association was undoubtedly conditional on its performance.

Furthermore, there were some additional interesting variations in the results on the other attributes of professionalism. A service motivation, coupled with autonomy and integrity in dealing with clients, was undoubtedly strongly endorsed. However, insofar as job attitudes were concerned, although opportunities for independent thought and action appeared to be present to a considerable degree, there was some disquiet over opportunities for personal growth and development and, above all, over remuneration. And, of course, such evidence of an 'instrumental' or 'pecuniary consciousness' runs counter to the 'ideal-typical' professional motivation. This situation was also apparent in the section on relevance to social values where, despite the overall feeling that in the eyes of the business community the professional, social and economic standing of accountants had improved in the last ten years, a certain unease about relationships and relative advantages *vis-à-vis* other professional and occupational groups in society was discernible. Finally, however, the very active 'leisure' patterns of accountants, and the considerable administrative responsibilities which they had assumed in this sphere, were fully in accord with professional modes of conduct.

It cannot of course be claimed that, on the basis

of a single survey, we have been able to make other than an important step in the direction of assessing the professional role of the chartered accountant in modern Britain. Certainly, in future research, the findings from questionnaire surveys should be amplified through grounded theories based on the study of actual accountants at work in their own professional offices. And, there is no doubt that dynamic processes of change in professions (cf. Wilensky, 1964; Tricker, 1982; Saks, 1983) can only be realistically examined either by means of historically-informed inquiries based on documentary and similar sources or by longitudinal studies which are necessarily expensive in both time and resources. In combination, however, these various approaches should ultimately enable the attributes of professionalism in an expanding and increasingly influential group in British society to be fully identified and accurately measured.

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The Microcomputer as a Tool in Financial Planning and Control: Some Survey Results

J. C. Higgins and E. J. Opdebeeck

Introduction

There is much evidence in the literature of the use of computer models in financial departments and also of the use of computers in corporate and financial planning. Grinyer and Wooller (1975) and Higgins and Finn (1977) have surveyed the use of computers in corporate planning and financial modelling in the UK. Other authors (Traenkle *et al.*, 1975; Naylor and Schauland, 1976; Klein, 1982) have carried out similar surveys in the USA, while Boulden (1971) carried out a survey on computerised corporate planning in a number of countries including the USA and the UK. The application and implementation of these models has also been examined by a number of authors (Gershofski, 1969; Wheelwright and Makridakis, 1972; Myers and Pogue, 1974). Other authors have advocated the use of computers in financial and corporate planning (Jenkins, 1973; Hamilton and Moses, 1974; Power, 1975; Bowker, 1980), and written on the selection of financial planning packages (Higgins and Whitaker, 1972). However it has been suggested that the use of computers by top management is low (Bonini, 1978), while Hall (1973) found that top management were not finding strategic planning models useful.

McInnes and Carleton (1982) have examined the reasons for the gap between the theory and implementation of financial models: the difficulty of gathering the relevant input information, the problems of risk and uncertainty, and the difficulty in satisfying multiple and conflicting corporate objectives. These authors express the view that computer-based financial modelling systems have gained greater acceptance in all types of business organisations compared to ten years ago, and that the growth of this type of application will continue at a rapid pace. Grinyer and Wooller (1980) have examined how the attitude to, and the application of, corporate modelling in the UK has changed over the last ten years. They describe the trend away from huge models of the entire organisation towards a more modular approach consisting of a number of interlinked models. They suggest that this leads to a more rapid, cheaper and more flexible modelling approach. They also cite the lack

of senior managers undertaking *ad hoc* modelling and using computer terminals themselves. However, their study was undertaken before the impact of microcomputers became apparent.

We have undertaken a survey that aimed to document some of the applications of microcomputers in financial planning and control and related management information systems. Although microcomputers may not be appropriate for developing large scale corporate models, they should be useful aids in applying techniques such as decision trees, discounting models, financial ratio analysis, sensitivity analysis and risk analysis. They should also be very useful aids to senior management in *ad hoc* company modelling.

It is not appropriate here to rehearse the arguments for financial modelling, nor to describe the types of models derived. These are well documented by such authors as Grinyer and Wooller (1975), Naylor (1979), Bhaskar (1978) and Bryant (1982). We named the particular techniques and models in our questions, on the assumption that most respondents were well aware of them.

Survey: design and analysis of respondents

Design

The data in this paper were gathered between January and April 1983, and pertain to the 106 organisations who responded to a postal questionnaire addressed to the 'Senior Executive responsible for Finance and Accounting'.¹ The questionnaire, along with two others, was sent with a covering letter addressed to the 'Chief Executive's Secretary/P.A.' to some 500 organisations. These were chosen randomly from a list comprising *The Times* list of the top 1000 companies together with a number of leading insurance companies, banking institutions and building societies.

The Respondents

106 companies replied to the questionnaire ad-

¹ A complete report of the survey and a copy of the questionnaire may be obtained from the authors at The University of Bradford Management Centre, Emm Lane, Bradford BD9 4JL.

Table 1
Turnover (or equivalent) for respondent companies

Turnover bands £m.	Respondents questionnaire		Those respondents using microcomputers	
	Number	%	Number	%
30-49	23	22	6	12
50-99	25	24	9	18
100-149	7	7	6	12
150-199	7	7	4	8
200-299	8	8	3	6
300-399	4	4	2	4
400-499	6	6	3	6
500-999	14	13	9	18
1000-4999	10	9	6	12
> 5000	1	—	1	2
No data	1	—	1	2
Total	106		50	

addressed to the senior executives. They are categorised according to company turnover in Table 1, and according to standard industry classification in Table 2. The standard tests showed that, at the 5% significance level, the companies responding approximately represented the turnover classification of *The Times 1000*.

Use of Microcomputers by Senior Management in Finance and Accounting

The first question was: 'Does your company use microcomputers in your financial department to provide information suitable for decision making?' Fifty companies (47%) answered in the affirmative and the remainder of the questionnaire only applied to them. Some of these 50 did not complete a full questionnaire, as specified in the tables.

The turnover figures of the 50 companies that did use microcomputers are shown in Table 1. At the 1% significance level, the larger companies tended to make greater use of microcomputers. This may be explained by their greater readiness to be innovative in this area although we might have expected, on historical and financial grounds, that the larger companies would tend to rely more on mainframe and minicomputers, while the smaller companies would tend to use microcomputers.

The next question asked whether the chief executive in the company used microcomputers. Only three respondents answered in the affirmative, and one of these specified that the chief executive uses the results of analysis carried out on a micro-computer. The second part of this question asked 'Do any of the directors (or members of the board) of your company use microcomputers?' The respondent was asked to specify which directors

Table 2
Respondents by industry

Category	Respondents	Those using microcomputers
Banking and finance	1	0
Beers, spirits and tobacco	5	2
Building societies	2	0
Ceramics and glass	2	0
Chemicals and pharmaceuticals	15	7
Construction	11	5
Clothing and footwear	2	1
Data processing, communication and office equipment	3	3
Electrical and radio	3	0
Engineering, metal and steel	8	3
Entertainment	4	2
Food, catering	5	3
Household products	1	0
Industrial plant manufacture	8	3
Insurance	3	1
Light engineering	3	1
Mining and power	2	2
Motor trade	4	2
Petroleum products and petrochemicals	4	2
Printing, publishing, packaging	6	4
Shipping	4	3
Stores, retailers, services	8	4
Transport	1	1
No data	1	1
Total	106	50

Table 3 Personal use of microcomputers by respondent	
<i>Frequency</i>	<i>Respondents</i>
Frequently (more than once per week)	11
Moderately frequently (between once per week and once per month)	10
Infrequently (less than once per month)	0

used them. Fourteen respondents answered that they did. Eight of these specified the 'Finance Director', and the remaining six specified the finance director along with another director such as operations, administration and manufacturing.

We next asked the question whether the respondent uses the microcomputer himself. Twenty-one said they did, the most common designation being financial controller or director, group accountant and planning manager. Addressed to those using microcomputers, we asked how frequently they use it. Their responses are shown in Table 3. We also asked how long on average they spend using it. The responses from 18 managers ranged from less than one hour per week to ten hours per week. The mean was 3.8 hours per week, with a standard deviation of 2.9 hours per week.

The next question had two sections: the first asked how often the respondent received a computer print-out of work carried out by a subordinate; the second asked how frequently he received a report written by a subordinate based on work done on a computer. The responses are shown in Table 4.

Microcomputers in management accounting

The next question dealt with the use of microcomputers in management accounting. We asked the respondents to specify in which management

accounting areas microcomputers are used in the company's Management Information System (MIS). The results are shown in Table 5; the average number of areas specified by the companies responding was 3.4, with most companies specifying at least two or three areas of application. It is worthwhile noting that almost all of the respondents use microcomputers in budgeting, whereas a smaller proportion use them in the other management accounting areas.

Microcomputers in financial accounting

The next question concerned use in financial accounting areas. The responses are shown in Table 6; there was an average of just under three citations per company, with a mode of four financial accounting areas cited. The two most frequent uses of microcomputers in this area are profit and loss account reporting and cash flow analysis. However microcomputers are also frequently used in balance sheet analysis and sources and uses of funds. A previous survey by Grinyer and Wooller (1975), on corporate modelling and computers, found that almost all companies used models to produce profit and loss accounts (98%), and most also produced balance sheets (79%) and cash flow statements (77%), and also sources and uses of funds (55%). They found that where a cash flow statement was not produced, a sources and uses of

Table 4 Use of output by senior managers				
	<i>Decision based on print-out</i>		<i>Decision based on report on work done on a computer</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Frequently (more than once per week)	15	30	14	28
Moderately frequently (between once per week and once per month)	18	36	18	36
Infrequently (less than once per month)	9	18	9	18
Never	5	10	5	10
No reply	3	6	4	8

Table 5
Management accounting applications
(47 respondents)

<i>Area</i>	<i>Respondents</i>	
	<i>Number</i>	<i>%</i>
Budgeting	43	91
Financial ratio analysis	26	55
Future cost analysis	21	45
Standard costing	13	28
Stock control	11	23
Product mix	10	21
Marginal costing	10	21
Transfer pricing	4	9
Other, including taxation (3), project appraisal (3), departmental costing (2), forecasting (2) etc.	22	—

Table 6
Financial accounting applications
(47 respondents)

<i>Area</i>	<i>Respondents</i>	
	<i>Number</i>	<i>%</i>
Profit and loss account	31	66
Cash flow analysis	31	66
Balance sheet	29	62
Sources and uses of funds	24	51
Other (including consolidation 5)	12	—

Table 7
Use in strategic decisions
and strategic planning (46 respondents)

<i>Area</i>	<i>Frequency not with microcomputer</i>		<i>Frequency with microcomputer</i>	
	<i>Number</i>	<i>%</i>	<i>Number</i>	<i>%</i>
Cash flow models	9	20	22	48
Net present value discounting	18	39	19	41
Sensitivity analysis	6	13	19	41
Financial corporate simulation model	10	22	16	35
Internal rate of return	16	35	12	26
Discounted pay-back period	11	24	10	22
Pay-back period calculation (without discounting)	18	39	7	15
Leasing models	10	22	6	13
Risk analysis	7	15	5	11
Valuation models	4	9	1	2
Capital rationing using linear programming	0	0	1	2
Decision trees	1	2	0	0
Others including forecasting, tax, supply/demand modelling (specified by respondents)	—	—	2	4

funds statement was often produced instead. Our survey found less frequent use of microcomputers in these four financial accounting areas, especially profit and loss accounts. We found that 21% of companies use cash flow analysis alone, 6% use sources and uses of funds alone, and 45% use both cash flow analysis and sources and uses of funds.

Microcomputers in planning

We asked the respondents which methods were used to analyse strategic decisions within the company, and which methods were implemented using a microcomputer. Although 11 of the 46 companies responding did not specify any strategic planning techniques implemented on a microcomputer, three cited one technique, no fewer than 14 of the 46 companies used two strategic planning techniques on a microcomputer, and a further 18 used 3 to 8 techniques on a microcomputer. The responses are shown in Table 7, which shows that cash flow models are the most widely used strategic techniques on a microcomputer. As expected, the discounting techniques such as net present value and internal rate of return are used by a number of companies. It was noted that eight organisations cited one discounted cash flow technique, twelve cited two techniques and three cited all the three techniques used on a microcomputer, viz. net present value, internal rate of return and discounted pay-back period. However another 21 companies cited the use of at least one of the techniques but not on a microcomputer. Thus 96% of the companies used a discounting technique, with about half of them using a microcomputer in its implementation.

The more complex techniques, however, such as linear programming for capital rationing and decision trees are rarely used. However these techniques can easily be programmed on a microcomputer, giving senior management the means to carry out a fast analysis for critical decisions.

Only five of the companies responding used risk analysis techniques on microcomputers. A previous survey in the USA (Naylor and Schauland, 1976), found that 36% of companies using corporate modelling used risk analysis techniques in building the model. In another survey in the UK (Grinyer and Wooller, 1975), it was found that only 25% of the companies incorporated risk analysis into their models. The same survey concluded that, although many modellers realise the potential of risk analysis, it is difficult to incorporate it into their models until management becomes more familiar with the technique. In addition it is often difficult to obtain information on the probability distributions. Our survey showed that only 26% of respondents cited the use of risk analysis in their financial department, much the same as Grinyer and Wooller's result.

The use of decision tree analysis was cited by only one company in our sample, and this technique was not implemented on a microcomputer. This represents a smaller proportion of users than that documented by Longbottom and Wade (1973), who found that the field of capital investment was the most likely area where decision analysis could be applied. They pointed out that one of the factors impeding the progress of decision analysis as an aid to management decision making was the need to educate management in the concepts of this technique. A case where a microcomputer was used to implement a decision tree analysis is described by Phillips (1982).

Our survey on the use of microcomputers in planning has revealed similar results to that of Grinyer (1983), namely the low use made of sophisticated techniques such as risk analysis, linear programming and decision trees; but it reveals a strong emphasis in UK companies on cash flow and discounting models.

Use of software packages

We asked a question on the use of microcomputer packages in the finance department and their function. We specified that, if a large number of packages are used, the respondent should specify the three most commonly used. In all, 45 companies answered this question; 13 executives cited one package, 20 mentioned two packages and 12 cited three. We found that Visicalc was the most popular package, mentioned by over half of the respondents; one third cited MicroModeller. Other packages mentioned were SuperCalc, Mars, Wordstar, Micro FCS and Dbase II amongst others. The responses to this part of the question, and other parts pertaining to the use of these packages, are summarised in Tables 8 to 12. An earlier survey (Grinyer, 1983) also found that Visicalc and MicroModeller were by far the most common packages, used by 64% and 26% respectively of microcomputer users.

Grinyer and Wooller (1975) mention that the availability of financial modelling packages such as FCS on minicomputers will result in the more widespread use of *ad hoc* modelling. Now that this, and other modelling packages, are available on microcomputers it is likely that the use of *ad hoc* modelling will accelerate.

From Table 9 it can be seen that almost half of the packages cited are used by directors and chief executives. As expected, these financial packages are used extensively by senior finance management, but also by junior staff such as clerks. The results presented in Table 10 show that finance staff are generally responsible for the running of these packages, with very little help from computer specialists. This of course does not exclude the possibility of computer staff advising on the acqui-

Table 8
Commercial packages used (45 respondents
citing 89 packages)

<i>Package</i>	<i>Respondents</i>	
	<i>Number</i>	<i>%</i>
Visicalc	24	53
MicroModeller	15	33
Supercalc	7	16
Dbase II	3	7
Various nominal ledgers	3	7
Mars	2	4
Micro FCS	2	4
Desk top plan	2	4
Others (including Visiplus, Microwizard, Multiplan, Microfinesse, Decision Modeller etc.)	27	

Note: Wordstar was mentioned by 4 organisations

sition of these packages either formally or informally.

The data storage on microcomputers is limited and so they are in general not suited for use with

large databases. However they are well suited to analysing summarised information taken from other sources. This factor is demonstrated by the responses to the question asking how packages are

Table 9
Level of management using information
(89 packages cited by 45 respondents)

<i>Level</i>	<i>Packages</i>	
	<i>Number</i>	<i>%</i>
Directors and the chief executive	43	48
Senior finance management	74	83
Other finance management	62	70
Other finance staff (e.g. clerks)	40	45

Table 10
Level of management running the package
(89 packages cited by 45 respondents)

<i>Level</i>	<i>Packages</i>	
	<i>Number</i>	<i>%</i>
Senior finance management	41	46
Other finance management	48	54
Other finance staff	44	49
Computer specialists	13	15
Other (e.g. secretaries, clerks)	7	

Table 11
Use of package (89 packages cited by 45 respondents)

<i>Use</i>	<i>Packages</i>	
	<i>Number</i>	<i>%</i>
Information gathering	27	30
Information processing	74	83
Information utilisation in decision making	52	58

Table 12
Sources of information (89 packages
cited by 45 respondents)

Sources of information	Packages	
	Number	%
Internal company information	84	94
External information	10	11

used. Only 30% were used for information gathering, 83% for information processing and 58% for decision making (see Table 11).

Table 12 shows that, as yet, microcomputers are used mainly to analyse internal company information. The majority of the work done in the finance department will of course be involved with appraising projects based on internal data and reports.

Conclusion

47% of respondents replied that they used microcomputers in finance; of these 28% cited the use by directors of the company, and 42% used microcomputers themselves, spending from one hour per week to ten hours per week using the microcomputer, with a mean of 3.8 hours per week.

Of those companies using microcomputers, the most common application in the management accounting area was budgeting (43 out of 47, i.e. 91%), and financial ratio analysis (26 out of 47, i.e. 55%). Another common application was costing analysis (24 out of 47, i.e. 51%), either future cost analysis or standard costing or both.

There were four common applications of microcomputers in financial accounting: profit and loss account (used by 66% of the companies replying), cash flow analysis (66%), balance sheet (62%) and sources and uses of funds (51%).

In the responses to the question relating to the planning techniques implemented on a microcomputer, it was noticed that eight companies used one discounted cash flow technique, twelve used two techniques and three used the three techniques cited. 96% of the companies used a discounting technique, with about half of the companies using a microcomputer in the implementation of the technique.

We believe that the popularity of cash flow models and sensitivity analysis is an advance on previous usage, and reflects not only greater awareness of the techniques, but also the availability of microcomputers and associated software. Other operational research approaches are less popular, for example risk analysis and decision trees, and this may be due to lack of appropriate software, but we suspect that it is also probably due to lack of familiarity with the techniques.

Finally, the popularity of some microcomputer software packages must be noted, especially Visicalc and MicroModeller. Also the use of these, and other packages, by senior finance management as well as more junior staff is notable. The limitations dictated by the hardware and software constraints of microcomputers must again be highlighted, resulting in these packages being used more for information processing and decision making than for information gathering. Finally the predominant use of internal company information must be mentioned, perhaps signifying the lack of any real attempt at econometric modelling using microcomputers.

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Share Appraisal by Investment Analysts—Portfolio vs. Non-Portfolio Managers

Peter Moizer and John Arnold

Introduction

Investment analysts may be categorised broadly either as portfolio managers or as information intermediaries.¹ 'Portfolio managers' are those investment analysts who themselves use the information gathered from their own appraisal of equity shares in the management of portfolios. 'Information intermediaries' are those investment analysts whose share appraisal information is used by third parties but not by the analysts themselves. The purpose of this paper is to compare and contrast the equity share analysis procedures of UK investment analysts who are portfolio managers with those of analysts who are information intermediaries. If, as we shall argue, there are differences between the procedures and information used by the two types of analyst, accounting policy makers and others interested in the impact of corporate financial information should beware of incorrectly treating investment analysts as a homogeneous group.

The paper is divided into four sections. The first provides a brief discussion of the role of investment analysis and analysts. It will be argued that portfolio managers and information intermediaries are likely to have differing objectives and hence that they could be expected to approach share appraisals in different ways. The second section describes how the test instrument (a postal questionnaire) was used and what statistical techniques were employed. In the third, the findings of the tests are outlined and discussed within the theoretical framework provided in the first section. Finally, in the fourth section we draw our conclusions from the results and attempt to assess their implications.

Theoretical background and framework

In this section, we briefly examine the differing job specifications of portfolio managers and infor-

mation intermediaries and discuss the likely objectives of the two types of analyst and how differences in these objectives influence the nature of the analysis undertaken. For this latter part, we make use of the ideas developed in the literature of agency theory.

As defined above, information intermediaries are analysts who do not use the information generated by their own analysis for portfolio management purposes. Their role is the provision of information to other investment analysts and individuals who manage portfolios. For such information to be of value to portfolio managers, it must either be the product of a more detailed form of analysis than could be undertaken by the managers themselves or have been obtained from information sources not available to the managers. As a result, information intermediaries may be expected to be more specialist in both their acquisition and their analysis of information than are portfolio managers. For their part, portfolio managers have to spend time monitoring the composition of the portfolios for which they are responsible, organising the purchase and sale of securities and ensuring that changes in their clients' preferences have been reflected in the portfolios. In consequence, portfolio managers must inevitably spend less time and conduct less detailed research studies on individual securities than do the more specialist information intermediaries. The managers can also be expected to rely more on information provided by other investment analysts than do information intermediaries.

The above analysis suggests that the time spent and the degree of analysis undertaken by the two types of analyst will be different. However, in addition to these two factors, there may also be differences in the procedures followed by both groups resulting from their differing personal objectives. Agency theory provides some insights into the additional differences which might arise from these differing objectives.

The application of agency theory to the theory of the firm has been discussed in Jensen and Meckling (1976) and extended by Fama (1980). An

¹We are indebted to Professor Tom Lee for emphasising to us the importance of the distinction between the two categories of analysts.

agency relationship is defined as: '... a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent' (Jensen and Meckling, 1976, page 308). The theory has been most frequently expounded in terms of the relationship between a firm's owner (the principal) and the manager whom he engages to run it (the agent).

An agency problem arises where information asymmetry exists between the principal and the agent (it is usually assumed that the agent has more information about his performance than does the principal) and where the agent is averse to effort and derives satisfaction from the consumption of perquisites. In these circumstances the danger from the principal's point of view, termed 'moral hazard', is that the agent will increase his own utility by exerting less effort and consuming more perquisites than had been agreed in advance with the principal. Since the principal often cannot observe the agent's effort and consumption of perquisites directly, as a result of information asymmetry, he may be willing to incur costs, termed 'monitoring costs', to reduce the risk of the agent indulging in moral hazard. It may also be worthwhile for the agent to incur costs, called 'bonding costs', to persuade the principal that he is neither shirking nor consuming more than the contracted level of perquisites. By incurring bonding costs, the agent may reduce the probability of the principal engaging a new agent or attempting to reduce the agent's financial reward.

The two roles of investment analysts, as portfolio managers and as information intermediaries, may be analysed in the context of the agency relationships outlined above. Consider first investment analysts as information intermediaries. It is necessary to recognise at least three parties in this situation. The first is the investor(s) who is the legal owner of the firm under consideration. The second is the manager(s) of the firm, who has responsibility for the day-to-day control of its resources and hence of the capital invested by the owner. The third is the investment analyst who acts as an information intermediary between the manager and the investor. The existence of the above three parties gives rise to two particular agency relationships which are of interest in an evaluation of the role of the investment analyst—the relationship between the investor and the firm's manager, and that between the investor and the information intermediary.

The first relationship, between the investor (owner) and the manager, creates the possibility of moral hazard as described previously; the manager may attempt to exploit his superior information in order to exert less effort and to consume more perquisites than had been agreed in his contract

with the owner of the firm. In consequence, the owner may be willing to incur monitoring costs. Investment analysts, acting as information intermediaries, can contribute to the monitoring process by providing existing and potential owners, not only with information about the past actions of management, but also with an indication of its future intentions. The analyst's commentary may also include a comparative review of the manager's performance relative to that of other managers in similar organisations. By these means, the activities of information intermediaries can help minimise the overall agency costs associated with the separation of ownership and control of a firm.

The second agency relationship, between the investor and the information intermediary, also creates the possibility of sources of moral hazard being present for the information intermediary. One such source is shirking, where the amount of effort expended by the information intermediary cannot be directly observed by the investor. A second example of a source of moral hazard is where the remuneration of the intermediary depends in part on the number and size of security transactions undertaken by his investor client; for example, where the intermediary receives a commission based on the value of each share purchase or sale made by the client. Such commissions form a substantial part of the remuneration of stockbrokers in the UK. In this case, it may be to the information intermediary's financial advantage to persuade the investor to trade in securities as frequently as possible even if such trading is not in the best interest of the investor, and it may also be worthwhile for the intermediary to incur costs to increase the probability that the investor will trade.

Fama (1980) has argued that lack of effort and excessive consumption of perquisites by firm managers may be controlled if the market for managerial services is efficient. For example, managers who shirk or who consume excessive perquisites will be perceived by the market to be managing firms which are less profitable than otherwise similar organisations run by managers who work harder and consume fewer perquisites. Consequently, the contracts which these less efficient managers are able to negotiate will be less favourable over time than those of more efficient managers. The same line of argument could be applied to the market for information intermediaries. However, as an investor client is unlikely to be aware of the uncontrollable factors affecting the outcome of a particular investment recommendation, he will find it difficult to judge the performance of an information intermediary on the strength of a particular recommendation, since the success or failure of a recommendation will in part be the product of random factors unknown to the client. A long term assessment of the intermediary's performance over a large number of recommendations

is required, when random factors may be expected to cancel each other out.

Unfortunately, little evidence exists concerning the extent to which the market for information intermediaries is efficient. Our own, admittedly casual, observations suggest that few systematic attempts are made to collect evidence concerning the performance of information intermediaries. If these casual observations are supported by more thorough research, implying that the market for information intermediaries is not efficient, it may be worthwhile for the intermediary to incur bonding costs in order to assure his investor client that he is not shirking. We have already noted that it may also be worth his while to generate data so as to persuade his client to trade more frequently. These two factors together suggest that the information intermediary may undertake analyses which are more detailed than would have been the case if the potential moral hazard problems described above did not exist.

Consider now the second role of investment analysts, i.e. as portfolio managers. A portfolio manager is a party to at least two agency relationships. First, he is the agent of the principals who provide the capital of the fund which he is managing. In the second relationship, the portfolio manager is the principal and the agents are the managers of the companies in which the fund owns shares. In his role as agent, the portfolio manager's performance will be judged by the performance of the investment fund managed by him. Therefore, there would appear to be no additional personal return to the portfolio manager for undertaking more than the analysis that he would need in order to build portfolios with the risk and return characteristics regarded as satisfactory by his clients.

The preceding analyses of the behaviour of investment analysts as both information intermediaries and portfolio managers suggest differences between the two types of analyst which may be tested empirically. Analysts who are producing information primarily for their own use (portfolio managers) are likely to undertake less detailed and less frequent analyses than analysts (information intermediaries) who are producing the information for third parties. The null form of this hypothesis may be stated as follows:

H_0 There is no difference between the level of detail and frequency of analyses undertaken by portfolio managers and those undertaken by information intermediaries.

Rejection of H_0 would be consistent with the view that investment analysts do adopt differing practices depending on whether they are portfolio managers or information intermediaries. The direction of the differences will be indicated when the results are discussed.

Description of the tests used

The design and implementation of the questionnaire survey is described in Arnold and Moizer (1984). A questionnaire containing one hundred distinct questions was mailed to 505 investment analysts resident in the UK. 304 replies were received (a response rate of 60.2%). Of these 304 respondents, 202 spent part of their working week analysing the ordinary shares of companies listed on the UK Stock Exchange. The replies of these 202 analysts formed the basis for the statistical tests. Respondents were asked: 'For whose ultimate use is the information intended which is generated by your own appraisals of company shares?' The replies to this question formed the basis for the partition of the sample: those analysts who indicated that they used the information for portfolio management purposes were classified as portfolio managers and those who did not were classified as information intermediaries. Respondents could tick more than one response to the question concerning the recipient of the analyst's information and some of those classified as portfolio managers also acted as information intermediaries (17 to institutional clients and 21 to individual clients). We decided not to prejudge these respondents' behaviour and retained them within our sample, mainly because any bias introduced by including as portfolio managers analysts who are also information intermediaries acts against rejection of the null hypothesis and against acceptance of the view that portfolio managers and information intermediaries undertake analyses which are different in terms of both detail and frequency.

After removing the portfolio manager/non-manager question, there remained 99 questions, of which 89 produced ordinal scale answers, 8 produced dichotomous answers and 2 produced nominal scale answers. The Mann-Whitney U test was used to compare the 89 ordinal scale answers for the two groups of portfolio managers and non-managers.² The chi-squared test was used to test for differences between the two groups for the remaining 10 questions.

Results of the comparison of the replies

The sample of 202 equity share analysts contained 92 portfolio managers and 110 information intermediaries. A significance level of 5% was chosen as the critical level for reporting differences and all the differences to be described in this section have a significance level of 5% or less.

²The Kolmogorov-Smirnov two-sample test was also employed, but its results merely confirmed the Mann-Whitney U test results at a lower significance level, and so the Kolmogorov-Smirnov results are not reported.

Table 1
Principal Activity of the Analyst's Organisation

<i>Type of organisation</i>	<i>Portfolio managers</i>	<i>Information intermediaries</i>
	%	%
Stockbroking firm	23.9	78.2
Insurance company	26.1	4.5
Bank	15.2	5.5
Pension fund	14.1	3.6
Investment management firm	18.5	1.8
Others	2.2	6.4
	<u>100.0</u>	<u>100.0</u>

Of the 99 questions, 48 produced answers which were statistically different at the 5% level for the two samples of portfolio managers and information intermediaries—many more differences than would be expected by chance. These differences will be discussed in the following subsections, where the general trend will be highlighted. In order to facilitate comparisons between the two samples, the results for each sample will be expressed as percentages.

Background Features

A description of the types of organisations in which the analysts worked is shown in Table 1. This table shows that in general the information intermediaries tended to work in stockbroking firms, whilst the portfolio managers tended to work in firms of institutional investors. A comparison of institutional and stockbroking analysts was also made, but this revealed fewer differences (only 21 at a 5% level), indicating that the nature of the role performed by an analyst is more important than the business activity of the analyst's employer in determining how the analyst will conduct his analysis. The results of Table 1 are also consistent with another set of responses which indicated that whereas 81.8% of information intermediaries produced share appraisal information to be used by external institutional clients, only 18.5% of portfolio managers did so (this 18.5% represents 17 managers of whom 15 worked for stockbrokers). There was, however, no difference in the production of information for portfolio managers within the analyst's own organisation (42.4% of portfolio managers and 43.6% of non-managers produced information for internal use).

Some impression of the difference in the depth of analysis undertaken can be gauged by combining the results of two separate questions. The first one revealed that portfolio managers spent on average much less of their time appraising listed UK equity shares (about 49% of the working week compared to 72% for information intermediaries). The second one showed that portfolio managers generally analysed more companies on a regular basis (an

average of approximately 49 companies compared to 34 companies for information intermediaries). Taken together these two findings suggest that portfolio managers performed a less detailed form of analysis than did information intermediaries.

Three other significant background differences were also found: (i) portfolio managers tended to work for organisations which employed fewer analysts (an average of 8.6 analysts in the managers' organisations compared to 13.0 for information intermediaries); (ii) portfolio managers had more experience as practitioners of investment analysis (e.g. 62.9% of managers had over 10 years experience compared to 48.2% of information intermediaries); and (iii) portfolio managers were much less inclined to specialise in a particular sector (23.9% of managers were specialists compared to 70.9% of investment intermediaries).

Analysis Techniques Used

No significant differences were found in the use of either technical analysis (i.e. the analysis of market based factors such as charts) or fundamental analysis (i.e. the analysis of such fundamental factors as general business conditions, industry outlook, earnings and quality of management). Fundamental analysis was 'usually' or 'almost always' used for about 96% of share appraisals and technical analysis for about 24% of appraisals. Beta analysis was used significantly more often by portfolio managers than by information intermediaries, although the level of use was low, as Table 2 indicates.

It was not possible to detect any significant differences in the way fundamental analysis was undertaken. The basic technique (described more fully in Arnold and Moizer (1984)) appeared to be that the analyst would forecast earnings for on average about two years ahead and apply an estimated price-earnings ratio to the earnings figure in order to compute a future market price. Dividend yields, various financial ratios and the company's net asset value would also be considered during the evaluation. Of the various possible bases for calculating net asset values, no differences

Table 2
How Often Beta Analysis Was Used During Each Appraisal

	<i>Portfolio managers</i>	<i>Information intermediaries</i>
	%	%
Almost always (96-100%)	2.2	1.8
Usually (66-95%)	5.4	3.7
Sometimes (36-65%)	19.6	17.4
Seldom (6-35%)	32.6	17.4
Hardly ever (0-5%)	40.2	59.7
	<u>100.0</u>	<u>100.0</u>

were found in the use of historical cost, current cost or realisable value, but there was a significant difference in the use of historical cost adjusted to reflect changes in general purchasing power, as indicated by Table 3. The cause of this difference is not immediately apparent. It may be that portfolio managers are more concerned about the effects of general inflation, since it can be used as the benchmark against which to measure the performance of a manager's portfolio. However, as the overall level of usage was low, this finding is perhaps not too important.

Of the eleven questions concerning the content of analysts' forecasts, nine produced significantly different answers. Details are shown in Table 4. In all but one of these nine cases (the ratio of turnover

Table 3
How Often the GPP Adjusted Valuation Base Was Used

	<i>Portfolio managers</i>	<i>Information intermediaries</i>
	%	%
Usually	15.2	11.3
Sometimes	35.4	20.6
Seldom	49.4	68.1
	<u>100.0</u>	<u>100.0</u>

to capital employed, a factor not usually forecast by either type of analyst), information intermediaries forecast each item more often than port-

Table 4
How Often Various Factors Were Forecast During an Appraisal

		<i>Almost always (96-100%)</i>	<i>Usually (66-95%)</i>	<i>Sometimes (36-65%)</i>	<i>Seldom (6-35%)</i>	<i>Hardly ever (0-5%)</i>
Turnover (sales):	PM	23.5%	23.5%	28.4%	4.9%	19.7%
	II	38.4%	23.1%	15.4%	8.7%	14.4%
Pre-interest profit:	PM	32.9%	22.8%	16.5%	7.6%	20.2%
	II	52.0%	23.5%	9.8%	4.9%	9.8%
Pre-tax profit:	PM	59.8%	20.7%	8.0%	2.3%	9.2%
	II	77.4%	17.0%	2.8%	0.9%	1.9%
Post-tax profit:	PM	43.0%	19.0%	17.7%	6.3%	14.0%
	II	58.3%	20.4%	8.7%	5.8%	6.8%
Cash flows:	PM	20.2%	19.1%	36.9%	8.3%	15.5%
	II	29.8%	30.8%	24.0%	9.6%	5.8%
Dividends:	PM	47.1%	31.0%	9.2%	2.3%	10.4%
	II	68.5%	17.6%	8.3%	0.0%	5.6%
Earnings per share:	PM	64.8%	20.5%	3.4%	1.1%	10.2%
	II	82.9%	12.4%	2.8%	0.0%	1.9%
Ratio of turnover to capital employed:	PM	6.1%	17.1%	30.5%	15.8%	30.5%
	II	4.0%	6.0%	25.0%	25.0%	40.0%
Return on capital employed:*	PM	19.0%	25.0%	25.0%	10.8%	20.2%
	II	18.7%	18.7%	25.2%	17.8%	19.6%
Price-earnings ratio:	PM	44.8%	32.2%	9.2%	4.6%	9.2%
	II	61.9%	21.0%	5.7%	0.9%	10.5%
Market value of share:*	PM	29.6%	22.2%	18.5%	9.9%	19.8%
	II	40.6%	19.8%	13.5%	9.4%	16.7%

PM = Portfolio manager II = Information intermediary

* = No significant difference. All other differences significant at a 5% level

Table 5
How Often Various Sources of Information Were Used During an Appraisal

	<i>Portfolio managers</i> %	<i>Information intermediaries</i> %
Company's Annual Report:		
Chairman's Statement	85.7	90.1
Directors' Report	78.1	89.3
Balance Sheet	89.9	94.3
Profit and Loss Account	90.7	95.2
Statement of Source and Application of Funds	75.1	89.6
Supplementary Current Cost Information	64.2	73.1
Value Added Statement*	52.5	57.4
Auditor's Report*	63.4	63.0
Quarterly and Half-yearly Figures	88.0	93.9
Employee Newsletters	28.5	42.2
Government Industry Statistics	46.1	62.1
Statistical and Information Services*	75.1	70.8
Financial Press*	80.5	79.3
Trade Journals	40.0	65.9
Companies House	15.6	37.3
Discussions with Company Personnel	56.0	78.7
Other Investment Analysts	66.5	30.3
Usage percentages are based on the mean of the mid-points of the five point scale: Almost always (96–100%); Usually (66–95%); Sometimes (36–65%); Seldom (6–35%); Hardly ever (0–5%).		
* = No significant difference. All other differences significant at a 5% level.		

folio managers, supporting the argument that information intermediaries perform a more detailed analysis than portfolio managers.

Information Sources Used

Details of the extent to which various information sources were used are given in Table 5. With the two exceptions of the audit report and the value added statement, all sections of a company's annual report, its quarterly and half yearly interim reports and employee reports, were used significantly more often by information intermediaries than by portfolio managers. Information intermediaries also made significantly more use of Companies House, government industry statistics and trade journals than did portfolio managers. The additional use made by information intermediaries of discussions with company personnel is considered below. Not surprisingly, the one information source used significantly more often by portfolio managers than by information intermediaries was other investment analysts.

The questionnaire also inquired about the degree of influence exerted by each information source on the respondent's ultimate share recommendations. The replies relating to the influence of company produced information showed fewer significant differences than the comparable use questions. Information intermediaries attributed a significantly greater degree of influence to the directors' report and the statement of source and

application of funds than did portfolio managers, but paradoxically portfolio managers attributed significantly more influence to an unqualified audit report than did information intermediaries. The overall perceived influence of the audit report was low, but even so this finding is difficult to explain. Of the remaining information sources, government industry statistics, Companies House and trade journals were all thought to have significantly more influence by information intermediaries, consistent with their greater use. Whilst there were no significant differences in the use of the financial press and statistical and information services, portfolio managers perceived these two sources to have significantly more influence. This result lends further support to the view that managers perform less analysis themselves and so have to rely more on the work of others. There is similarly a significantly greater degree of influence (as well as use) attributed by portfolio managers to other investment analysts.

Company Personnel

Another source of information about a company's financial performance is its management. Information intermediaries clearly consulted company personnel more often than portfolio managers (e.g. 53.3% of information intermediaries always consulted company personnel when making an appraisal of that company, compared to only 9.0% of portfolio managers). The frequency of contact is shown in Table 6.

Table 6
How Often a Company's Financial Performance Was Discussed With Its Management

	<i>Portfolio managers</i>	<i>Information intermediaries</i>
	%	%
Never	12.0	6.4
Less than once a year	28.3	7.3
Once a year	31.5	11.9
Twice a year	17.4	24.8
Three times a year	3.2	14.7
More than three times a year	7.6	34.9
	<u>100.0</u>	<u>100.0</u>

Whilst portfolio managers did discuss a company's performance with its management, it was clearly less often than for information intermediaries. This finding is in accord with the notion that portfolio managers do not need to update their forecasts as frequently as do information intermediaries. Similarly, whilst both types of analyst considered company personnel to be a most influential source of information about a company's performance, information intermediaries regarded this source as being more influential (e.g. 45.4% of information intermediaries considered company personnel to be of vital influence compared to 25.8% of managers).

The questionnaire included seven types of information which might be disclosed by company management (see Arnold and Moizer (1984)) and asked respondents to indicate how often each type was provided when the analyst discussed a company's performance with its managers. No significant differences were found for six of these types of information, indicating that company management did not appear to distinguish between portfolio managers and information intermediaries in the type of information provided. The only significant difference related to the disclosure of

reasons for balance sheet changes (45.5% of information intermediaries almost always received this information from company management, compared to only 21.1% of portfolio managers).

Criticisms of Annual Accounts

Ten criticisms of annual accounts were suggested to respondents, but only three produced any significant differences in the answers of portfolio managers and information intermediaries. The answers to these three criticisms are shown in Table 7. The differences shown in Table 7 illustrate the differing outlook of portfolio managers and information intermediaries. While both types of analyst would like to see a more detailed analysis of a company's results in its annual report, information intermediaries felt more strongly about the issue than did portfolio managers; a finding which is in accord with the view that information intermediaries analyse company performance in more detail than do portfolio managers.

The third criticism shown in Table 7 is especially interesting, because there is a clear division of opinion. On average, portfolio managers would prefer company management to include a forecast of next year's sales and profits in the company's

Table 7
Criticisms of Annual Accounts

	<i>Insufficient segment reporting*</i>		<i>Inadequate geographical analysis</i>		<i>Management sales/profit forecast necessary</i>	
	PM	II	PM	II	PM	II
	%	%	%	%	%	%
Strongly agree	19.3	44.8	8.0	21.5	11.4	7.5
Agree	45.4	34.6	38.6	40.2	33.0	15.1
Neutral	27.3	15.9	37.5	24.3	27.3	29.2
Disagree	5.7	2.8	15.9	12.1	17.0	27.4
Strongly disagree	2.3	1.9	—	1.9	11.3	20.8
	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

PM = portfolio managers II = information intermediaries

*'Segment reporting' was described as: 'the sales, operating profit and assets employed by each of the company's different business activities'



annual report, but information intermediaries were against the idea. This finding suggests that analysts who manage portfolios do not generally regard themselves primarily as information intermediaries, since the production of a sales/profit forecast by management is unlikely to be in the information intermediary's own best interest, particularly if he obtains similar information directly from company management (Arnold and Moizer (1984)).

Summary and conclusions

The evidence from our questionnaire survey seems to indicate rejection of the null hypothesis stated at the end of the first section that there is no difference between the level of detail and frequency of analyses undertaken by the two types of investment analyst (portfolio managers and information intermediaries). We have reported many more significant differences between the behaviour of the two types of analyst than can be explained by chance and may thus reject H_0 . In virtually all cases where significant differences were observed, we found that portfolio managers undertook analyses in less detail and with less frequency than did information intermediaries. The evidence given in the paper supports our main hypothesis that investment analysts who are information intermediaries undertake analyses which are both more detailed and more frequent than those undertaken by their portfolio manager colleagues. We now summarise our main findings in more detail.

Although the respondents' answers revealed differences in the amount of analysis undertaken, they did not reveal a significant difference in the analysts' approach to share appraisal. Both portfolio managers and information intermediaries appeared to follow the same basic pattern of fundamental analysis in which the future earnings of a company are estimated for the next two years and capitalised using a price-earnings ratio. Technical analysis was also sometimes used, possibly to supplement the results of the fundamental analysis. Beta analysis was seldom used by either group, although there was a significantly greater degree of non-use of beta analysis by information intermediaries compared to that by portfolio managers. This last finding is understandable in terms of the agency framework we developed in the first section.

The conclusion that portfolio managers analyse companies in less depth than do information intermediaries is derived from a number of findings. Portfolio managers appeared to appraise more companies than did information intermediaries, but spent less of their working week analysing company shares. Information intermediaries also made greater use of the following information

sources: company annual and interim reports, company personnel, employee newsletters, Companies House, trade journals and government industry statistics. In contrast, portfolio managers relied more on other investment analysts as a source of information relating to a company's performance. Information intermediaries held much more frequent discussions with company's management, although they did not seem to receive any more information at each discussion than did portfolio managers (the one exception being the disclosure of management's reasons for any balance sheet changes which was received more often by information intermediaries).

The differing attitudes of the two groups were also revealed in their comments on a series of criticisms of company annual accounts. Whilst both groups were in favour of more geographical analysis of a company's results and more analysis in terms of a company's various lines of business, information intermediaries felt significantly more strongly in favour of this additional disclosure than did portfolio managers. A divergence of opinion was found on the question of whether management should include a forecast of next year's sales and profits in its company's annual report. On the whole, portfolio managers were in favour of this proposal but information intermediaries were against it. This result highlights the differing objectives of the two groups and can be rationalised in terms of the theoretical arguments presented in the first section. For example, if company managers were to present their own forecast, part of the analyst's role as a reducer of agency costs would be rendered unnecessary, because management would be assuming it themselves.

The implication of this research for accounting policy makers is that investment analysts who act as information intermediaries are unlikely to be good proxies for portfolio managers (and by extension for individual investors). If policy makers wish to assess the usefulness of accounting reports to various groups in society, they should consider investment analysts as comprising (at least) two heterogeneous groups, i.e. information intermediaries and portfolio managers.

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Physical Capital Maintenance in a Credit Economy*

Timothy G. Sutton

Introduction

Major changes in the external financial reporting of large companies have been adopted in the UK (SSAP 16, ED 35) and the USA (SFAS 33) in response to the perceived deficiencies of the historical cost convention in times of inflation. These changes affect both the measurement of corporate earnings as well as the reported valuation of corporate assets. An important influence on policy-makers in both countries has been the theoretical study of income measurement from a physical capital maintenance (PCM) perspective. Many examples of this work illustrate the characteristics of PCM-based income in a simplified setting, e.g., a two-period framework in which a trader in a cash economy is faced with a one-time change in trading conditions, namely a change in his asset prices at the start of the second period. This paper employs a similar approach but examines the effect of specific price changes in an economy where credit as well as cash transactions are permitted.

In a competitive economy where nominal interest rates are positive, the credit price of a good or service is clearly greater than its corresponding cash price. In this paper the relationship between the cash and credit prices of a product is shown analytically and an accounting example is used to reveal the properties of concepts such as 'operating profit' and 'net income' in a credit economy. One interesting finding is that the PCM-based operating profit of a credit-reliant firm has a specific interpretation which is not widely understood: it signals to financial statement users not only that current values have been used to cost the goods or services sold but also that management intends to

use (or continue to use) trade credit to purchase inputs. An important implication of this and related findings is that, so long as the assumptions of the PCM model are met, no monetary working capital adjustment is needed in arriving at a distributable income number that is consistent with the PCM objective.

The argument is developed as follows. In the following section I define the term 'physical capital maintenance' as it is used in this paper and illustrate this concept of capital maintenance in a cash economy. The relationship between the cash and credit prices of a product is demonstrated in the next section and the PCM concept is again explored by way of example, this time in a credit economy. Succeeding sections raise and, I hope, answer objections to my derivation of the credit price and discuss the implications of the analysis for both policy makers and financial statement users. Possible extensions of the analysis, along with a summary of the findings, are set out in the final section.

The physical capital maintenance approach to income measurement

Assume that a minimum goal laid down by a firm's management is the maintenance of the firm's capital over time. Capital can be here defined in one of essentially two ways: as the firm's productive capacity (i.e., the sum of its physical assets) or as the financial investment by the owners in the firm. These two capital maintenance objectives represent polar positions: hybrid concepts have been proposed (e.g., operating capital maintenance, adopted by the UK's ASC), which include certain monetary assets and liabilities as well as physical assets within the definition of capital. In this paper we restrict our attention to only one capital maintenance concept, that of physical capital. This concept was chosen because it played a formative role in the development of both the UK's and the USA's inflation accounting standards.¹

Even the term 'physical capital' is ambiguous, however. Following the Sandilands Report, it is possible to identify at least four ways of describing it.² Nonetheless, all the definitions share a common

*This paper benefited from the helpful comments of Michelle Hamer of the University of Maryland. I am also indebted to Lawrence Revsine of Northwestern University for his comments on an earlier draft.

¹The merits and, more particularly, the demerits of physical capital maintenance as a basis for income measurement have been exhaustively discussed in Sterling and Lemke (1982).

²It can be defined as: the physical assets of the company; the capacity to produce the same volume of goods; the capacity to produce the same value of goods; or the value to the firm of the potential services contained in those assets (IAC, 1975, paragraphs 117 and 129).

feature. No profit is reported for a period by an enterprise until sufficient resources have been set aside to ensure that its physical capital (however defined) at the start of the period has been maintained. Maintenance of start-of-period physical capital can be achieved if, when determining the profit available for distribution, the current cost of the physical capital consumed in the period has been charged against period revenues.³

An example may serve to illustrate this point.⁴ At the start of period t , a cash trader, A, invests £10,000 in a new business. He plans to trade in product x , selling one unit and then replenishing his stock at the start of each period. Each unit costs £10,000. An initial balance sheet is set out in Exhibit I:

Exhibit I		
Firm A		
<i>Balance sheet at the start of period t</i>		
Assets	Stock	£10,000
A's Equity		£10,000

A's trading activities each 90 day period are simple. One unit is sold (for £12,000) early in the

period and the proceeds from sale are invested in a short-term debt instrument. The inventory is immediately replenished, the new stock being financed with short-term borrowings. The maturities of the loan and the investment are both 90 days. The borrowing and lending rates are likewise equal (10% p.a. or $2\frac{1}{2}\%$ per 90 days). Interest accrues daily on both the loan and the investment. We assume there are no other revenues or expenses.

Financial statements are drawn up at the end of each quarter and all of the net income reported is distributed at the start of the following period when cash settlement takes place. Exhibit IIA contains the financial statements for the first period t (when specific prices are stable).

By charging against revenues the current cost of the asset sold and by restricting the dividend to 100% of reported net income, A ensures that the physical capital of his business is maintained. Net assets at both the start and the end of period t are the equivalent of 1 unit of stock costed out at its cash price.

This result also holds in a period of changing input prices so long as the current (replacement) costs of the inputs are charged against revenues. Assume, for the sake of simplicity, that input and output price rise by 10% at the start of $t + 1$, all other conditions remaining the same. If the current unit cost (£11,000) of product x is charged against $t + 1$ sales revenues and a similar distribution policy is pursued, net assets at the end of $t + 1$ will continue to be equivalent to 1 unit of stock (valued at current cash cost) and physical capital will have been maintained, as Exhibit IIB demonstrates.⁵

Credit prices and physical capital maintenance

The credit price of a good or service consists of two elements: the price the vendor would accept if the purchaser offered cash at the time of the transaction and the charge levied for the delay in cash settlement. In a competitive economy, the latter element, hereafter called the financing charge, will be equivalent to the interest the vendor would have earned during the period the trade debt was outstanding, if the sale had been made for cash.

There is a further element in the financing charge, however. By forgoing the immediate receipt of cash, the vendor accepts the risk of customer default. The less creditworthy the customer, the higher is that risk. Thus the financing charge will be equivalent to the interest the vendor would have earned on an investment of equivalent risk.⁶

We can express the above in algebraic form. In a competitive economy, the unit sale price of product x quoted *ex ante* by firm j to customer k , $P_{x,k}$, will be a variable price, depending on both the opportunity cost of offering credit to customer k

³Where more than one factor input is employed, factor substitution may take place when the price of one input rises relative to those of the others. Unless 'current cost' reflects the shift in factor proportions, the charge against revenue will be overstated. In addition, defining physical capital maintenance in start-of-period terms assumes that the volume of output associated with that level of capital is optimal, not only at the start of the period but also at the end. A change in the output price relative to input prices may well cause optimal output, and the physical capital required to produce it, to change. Defining physical capital maintenance in *ex post* terms, i.e., incorporating the effect of changes in input and output prices in the charge for asset consumption/use in the income statement, will clearly yield a different distributable income number from an *ex ante* definition of PCM. For an elaboration of these points, see Petri and Gelfand (1979). In this paper we avoid such difficulties by assuming a (one input/one output) trading economy where the optimal level of activity does not change as a result of the price changes posited.

⁴This example is an adaptation of one used by Revsine (1981a) p. 384. The major conceptual difference lies in the timing of the purchase and sale transactions. In this and all future examples, it is assumed that there is no change in the general price level in the periods examined.

⁵Note the additional assumptions that are implicit here. First, markets are competitive. Second, the trading cycle is continuous. No switching from physical to monetary assets takes place to take advantage of any market disequilibrium. Third, problems of technical change are ignored (see Revsine 1979, for further discussion). Fourth, capital maintenance is defined in terms of *existing* prices. More generally, expected changes in the economic environment (including future prices) are not taken into account in determining income and, by extension, the capital to be maintained (see May, 1976).

⁶The 'investment' in the credit-seeking customer is measured by the cash sales value, not the cost, of the items sold to him.

Exhibit II
Trading in a cash economy...

A. ...When Specific Prices Are Stable

B. ...When Specific Prices Are Changing

FIRM A [CASH TRADER]

FIRM A [CASH TRADER]

*Profit & loss account
for period t*

£

Revenue from sale	12,000
Cost of good sold	10,000
Operating profit	2,000
Interest income	300
Interest expense	250
Net income	2,050
Dividend declared	2,050
Net addition to A's equity	-0-

*Profit & loss account
for period t + 1*

£

Revenue from sale	13,200
Cost of good sold	11,000
Operating profit	2,200
Interest income	330
Interest expense	275
Net income	2,255
Dividend declared	2,255
Realised holding gain	+1,000
Net addition to A's equity	1,000

*Balance sheet
at end of period t*

£

Assets	
Stock	10,000
Short-term investment	12,300
Total assets	22,300
Less	
Liabilities	
Short-term loan	10,250
Dividend payable	2,050
	12,300
Net assets	10,000
A's equity	10,000

*Balance sheet
at end of period t + 1*

£

Assets	
Stock	11,000
Short-term investment	13,530
Total assets	24,530
Less	
Liabilities	
Short-term loan	11,275
Dividend payable	2,255
	13,530
Net assets	11,000
A's equity	11,000

- Assumptions:
1. One unit sold and inventory replenished at start of period. The first unit acquired with cash from equity. The second, and all subsequent units, financed by short-term borrowing.
 2. Other than in initial period, one unit purchased and sold each period (90 days).
 3. Maturities of loan and investment are the same (90 days). Borrowing and lending rates are the same (10% p.a. or $2\frac{1}{2}\%$ per 90 days). Interest accrues daily on loan/investment.
 4. Dividend, 100% of net income, paid at start of following period (at time of cash settlement).
 5. Increase of 10% in purchase price at start of $t + 1$. Sale price is adjusted immediately by same %.

and the period of credit sought by customer k :⁷

$$P_{x,k} = P_x(1 + r_k t_k) \quad (1)$$

where: $P_x = j$'s cash price for a unit of x
(Firm j offers a single product for sale);

r_k = daily interest rate j could earn from an investment of equivalent risk; and

t_k = credit period (in days) agreed *ex ante* between j and k .

So long as, at any given risk level, lending and borrowing rates are the same, customer k will be indifferent between buying j 's product on credit and the alternative of raising short-term debt and purchasing the good for cash.

The above framework can be used to analyse firm j 's purchase decisions. An enterprise has the choice of purchasing the inputs it needs either with borrowed cash or on credit. The credit price for

⁷The credit period need not be agreed upon *ex ante*. Only the interest rate on any unpaid invoices needs to be settled before the contract is made. Thus, it is not necessary for there to be a fixed credit price *ex ante*.

purchases can be similarly expressed as the sum of the cash price and financing charge. Assuming firm j purchases only one type of input (product y), the credit price demanded by supplier i from firm j is:

$$C_{y,i} = C_y(1 + r_j t_j) \quad (2)$$

where C_y , r_j , t_j are to supplier i what P_x , r_k , t_k are to firm j .

If firm j assumes customer k is of average credit standing ($r_k = \bar{r}$) and will take no more days' credit than the average customer ($t_k = \bar{t}$), (1) simplifies to:

$$P_{x,k} = P_x(1 + \bar{r}\bar{t}) = P'_x \quad (1a)$$

where P is the credit price for x quoted by firm j to its 'average' customer. Similarly, should firm j be for supplier i the 'average' customer that k is for j , (2) simplifies to:

$$C_{y,i} = C_y(1 + \bar{r}\bar{t}) = C'_y \quad (2a)$$

Operating profit for the credit trader is the difference between output at credit prices and the credit cost of the inputs consumed to yield that output. In the case of firm j , if we assume one unit of input y is required for each unit of output x , operating profit per unit of output equals $P'_x - C'_y$. In the absence of other revenues or expenses, this is also the net income per unit of output. Given our definitions of P'_x and C'_y , unit net income can also be characterised as unit operating profit at equivalent cash prices plus the net interest income (implicit in the credit prices of outputs and inputs) arising on each unit of x sold:⁸

$$P'_x - C'_y = (P_x - C_y) + \bar{r}\bar{t}(P_x - C_y) \quad (3)$$

Thus it should make no difference to the net income figure reported if a firm buys and sells on credit or for cash, so long as, in the cash case, the cash is borrowed and invested for similar periods and at similar risk to the borrowing and lending implicit in the credit alternative.

An illustration may clarify the argument. Consider the case of B , a credit trader. Like A , he buys and sells product x and, like him, he acquires two units initially, one with his own cash (£10,000) and

one with outside capital. In B 's case, however, the second unit is purchased on credit for £10,250, the credit price. All sales are credit sales, the credit price being £12,300 a unit. Both the credit purchase and sale prices are based on terms of net 90 days.⁹ As with Firm A , one unit is sold at the start of each quarter and, save for the initial period, inventory is replenished immediately, the new stock being purchased on credit. Exhibit IIIA sets out B 's financial statements in a typical period when specific prices are stable.¹⁰

Clearly, the operations of Firms A and B are identical. Their methods of financing, however, are not. Nevertheless, if the market for credit is competitive, there should be no difference in the economic performance of the two firms. It is reassuring to note that, under existing accounting practice, the two firms do in fact report the same net income (cf. Exhibits IIA and IIIA). The reason is simple. The interest income of £300 and expense of £250 shown separately in cash trader A 's income statement in period t are embedded in the credit prices of B 's output and input.

More surprisingly, Firm B can maintain its physical capital by following the same income measurement procedure and distribution policy as Firm A . Recall that Firm A charged against revenues the current cost of product x and distributed 100% of the resulting reported income. Exhibit III shows the income statement and balance sheet effects of B adopting the same policies in times not only of stable prices (IIIA) but also of rising specific prices (IIIB). One important insight is revealed by those statements. In measuring the current cost of the inputs consumed, the credit cost, not the cash cost, of the inputs must be used. It follows that the physical capital B seeks to maintain, equivalent at the start of period t to 1 unit of inventory, is valued in B 's balance sheet at its current credit cost (£10,250). As Exhibit IIIB shows, the firm has maintained its physical capital. Net assets at the end of $t + 1$ are equivalent to 1 unit of stock valued at end $t + 1$ credit cost.

Objections

Do the conclusions drawn so far rest on a misleading distinction between cash and credit prices? Before turning to the implications of the argument developed in the previous sections, I put forward and, I hope, answer possible objections to my derivation of the credit price.

The main criticism that may be made of the analysis is its lack of correspondence with business practice. Companies that offer credit set one price for their good or service. They do not quote two prices (or, rather, price schedules), one for those purchasing with cash, the other for credit-seeking customers. There are two counter-arguments to this objection. First, in many instances we observe

⁸This can also be expressed as unit operating profit at equivalent cash prices 'grossed up' by the interest element in the credit prices:

$$P'_x - C'_y = (P_x - C_y)(1 + \bar{r}\bar{t}) \quad (3a)$$

⁹If Firms A and B both face competitive markets in the purchase and sale of product x , these credit prices and terms indicate that Firm B charges (is charged) interest equivalent to 10% p.a. for the credit it offers (receives).

¹⁰ B 's financial statements in its initial period have not been presented here, although it is easy to reconstruct them. Because B plans to conduct his business on credit and only on credit, all inputs, even those purchased for cash (e.g. the first unit of stock purchased), must be charged against revenues at their equivalent credit prices for physical capital to be maintained (valued at credit prices). Hence, B 's equity will increase from £10,000 to £10,250 at the end of the first period of trading.

different prices being offered for the same good or service, where the difference is based on the actual period of credit taken. Cash discounts are designed to encourage credit-taking customers to pay early (i.e. as if they were cash customers): the size of the reward (the discount) is based on the savings to the vendor from avoiding the burden of supplying credit.

The cash discount need not take the form of a stated percentage reduction in the quoted price for payment within a certain number of days (e.g. the discount terms of 2/10, n/30 widely used in the USA). A vendor may simply quote a lower price for immediate cash payment. A good example is the practice in the USA of oil companies through their retail outlets offering discounts to customers who pay in cash rather than by bank card: without

the discount, the former would subsidise the latter since bank card issuing companies levy a service fee on retailers for meeting promptly the debts of their card-holders. Often, however, the customer negotiates the discount on an individual basis. Of course, this assumes that individual negotiation is feasible, a situation more likely where potential buyers are few and the amount of credit sought is large.

Second, it may not be practicable to offer a credit price schedule with the price increasing with the number of days credit taken. If only one price is quoted, it is in effect an average credit price based on the average period of credit taken by the customer of average creditworthiness. The vendor gains when customers pay 'early' (i.e. within the stipulated credit period) and loses when they pay

Exhibit III Trading in a credit economy...

A. ...When Specific Prices Are Stable

FIRM B [CREDIT TRADER]

<i>Profit & loss account for period t</i>	£
Revenue from sale	12,300
Cost of good sold	10,250
Operating profit	2,050
Interest income/expense	-0-
Net income	2,050
Dividend declared	2,050
Net addition to B's equity	-0-

<i>Balance sheet at end of period t</i>	£
<i>Assets</i>	
Stock	10,250
Trade debtor	12,300
Total assets	22,550
Less	
<i>Liabilities</i>	
Trade creditor	10,250
Dividend payable	2,050
	12,300
Net assets	10,250
B's equity	10,250

B. ... When Specific Prices Are Changing

FIRM B [CREDIT TRADER]

<i>Profit & loss account for period t + 1</i>	£
Revenue from sale	13,530
Cost of good sold	11,275
Operating profit	2,255
Interest income/expense	-0-
Net income	2,255
Dividend declared	2,255
Realised holding gain	+1,025
Net addition to B's equity	1,025

<i>Balance sheet at end of period t + 1</i>	£
<i>Assets</i>	
Stock	11,275
Trade debtor	13,530
Total assets	24,805
Less	
<i>Liabilities</i>	
Trade creditor	11,275
Dividend payable	2,255
	13,530
Net assets	11,275
B's equity	11,275

Assumptions:

As for Exhibit II with the following differences:

1. With regard to units purchased, the second and all subsequent units are acquired on credit. All sales are credit sales.
2. Periods of credit for purchase and sale are the same (90 days).

'late'. Clearly, such a system lowers administrative costs. It does not alter the economic substance underlying the pricing policy, however.

Mention of cash discounts may prompt a further objection. Cash discounts are not formulated in the way suggested by our credit price computation. They are usually fixed in amount and do not vary with the credit period taken (more strictly, the period forgone). Again, however, administrative considerations are responsible. The costs of operating a variable cash discount policy would be considerable and would far outweigh the benefits, especially in current business conditions (moderate inflation and interest rates, together with short credit periods). It is interesting to note that where payment is contractually delayed or stretched over a long period (e.g. instalment sales), the parties recognise *explicitly* the financing element within the contract price in determining the value of the good or service transferred.¹¹

The granting of credit has been characterised here as a financing decision. Some would object that it cannot be treated exclusively as such: it is also an investment decision. Firms offer credit (and vary credit terms) as a means of increasing sales. In evaluating a firm's credit policy, so the argument runs, the benefits in the form of increased profits over time (discounted and adjusted for expected bad debts) must be compared with the cost to the firm of the credit offered. It is true that firms use credit as a weapon in their sales promotion. However, if the credit offered is 'below cost' (i.e. more favourable than the terms the customer could obtain through third party borrowing), the subsidy is in effect a reduction in the implicit cash price. Of course, offering such a price reduction may be in the vendor's interests if the demand for his product is price-elastic.

Implications

One major implication of the discussion so far is that, when physical capital maintenance is the objective and the assumptions of the PCM model are met, the only adjustments to the HC income statement that are necessary to allow for changes in specific prices are those to cost of sales, depreciation and other expenses arising from the consumption of physical assets. No other adjustments are needed. It follows that a 'monetary working capital adjustment' (MWCA), if included, will

misstate current cost operating profit and, by extension, distributable income.

Objection to the MWCA rests in part on its derivation. SSAP16 defines monetary working capital as the net amount of trade debtors and trade creditors, plus any stocks not subject to COSA. As the analysis above shows, however, in competitive markets there is no difference in substance between a sale on credit and a sale for cash with the investment of the proceeds in a short-term instrument of similar maturity. More generally, there is no reason why a firm's management should not substitute for investment in trade credit an investment package involving long-term assets: one such would be a cash sale, investment of proceeds long-term and short-term borrowing to finance inventory purchases. In sum, the distinction in SSAP16 between monetary working capital and other financial assets and liabilities is artificial on economic grounds.

A more fundamental objection to the MWCA concerns its purpose. The standard is not clear on this issue. If the intention is to reflect in the measurement of current cost operating profit the *cost* of financing the change in (SSAP16-defined) MWC following a change in input prices, then the rationale for the MWCA rests on a misunderstanding. As has been demonstrated, the credit price contains an implicit financing charge which covers the cost to the firm of providing credit. An increase in the credit output price represents an increase in both the cash output price and in the implicit financing charge. Consider the set of circumstances outlined in Exhibit IIIB. At the start of period $t + 1$, the cost of product x increases by 10% and Firm B adjusts its sales price by a similar percentage. The increase of £1230 in the credit output price represents an increase in the cash output price of £1200 ($10\% \times £12,000$) plus the cost (of £30) of servicing the increase in the resulting debtor ($0.025 \times £1200 = £30$).

Using the same logic, it follows that the argument of retailers that no cost of sales adjustment is needed because the 'extra costs of stocks are financed by higher creditors' (Tesco Stores 1977) is specious. If a retailer plans to continue purchasing inputs on credit, then it should value those inputs at current credit cost and charge against revenues the current credit cost of inputs consumed when determining profit and thus the amount available for distribution. Only in this way will its physical capital be maintained.

This reasoning is illustrated in Exhibit IV. Note that if SSAP16 procedures are followed (see Exhibit IVB), Firm C's net income in period $t + 1$ is equivalent to that which it would report under the HC convention. In consequence, if 100% of reported income is distributed, physical capital will not have been maintained. In fact, there will be a

¹¹For US accounting practice in this area, see APB Opinion 21, 'Interest on Receivables and Payables.' The fact that receivables and payables arising from the 'normal course of business' and maturing in less than one year are excluded from the Opinion's provisions can be ascribed to the likely absence of a material impact on the financial statements from APBO 21 treatment. The principle underlying APBO 21 nonetheless applies to such assets and liabilities.

Exhibit IV

Trading in cash (output)/credit (input) economy when specific prices are rising...

A. ...And No MWCA Included

FIRM C [CASH/CREDIT TRADER]

<i>Profit and loss account for period $t + 1$</i>	£
Revenue from sale	13,200
Cost of good sold—at HC	10,250
HC operating profit	2,950
COSA	1,025
CC operating profit	1,925
Interest income	330
Net income	2,255
Dividend declared	2,255
Realised holding gain	+1,025
Net addition to C's equity	1,025

<i>Balance sheet at end of period $t + 1$</i>	£
<i>Assets</i>	
Stock	11,275
Short-term investment	13,530
	24,805
<i>Less</i>	
<i>Liabilities</i>	
Trade creditor	11,275
Dividend payable	2,255
	13,530
Net assets	11,275
C's equity	11,275

B. ...And MWCA Included

FIRM C [CASH/CREDIT TRADER]

<i>Profit and loss account for period $t + 1$</i>	£
Revenue from sale	13,200
Cost of good sold—at HC	10,250
HC operating profit	2,950
COSA	1,025
MWCA	-1,025
	-0-
CC operating profit	2,950
Interest income	330
Net income	3,280
Dividend declared	3,280
Realized holding gain	-0-
Net addition to C's equity	-0-

<i>Balance sheet at end of period $t + 1$</i>	£
<i>Assets</i>	
Stock	11,275
Short-term investment	13,530
	24,805
<i>Less</i>	
<i>Liabilities</i>	
Trade creditor	11,275
Dividend payable	3,280
	14,555
Net assets	10,250
C's equity	10,250

- Assumptions:
1. One unit of stock purchased (on credit) and sold (for cash) at start of each period (90 days). Sale proceeds invested short term (at 10% p.a. rate).
 2. Period of credit (for purchase) and maturity of investment the same (90 days). Interest accrues daily on investment.
 3. 10% increase in (credit) purchase and (cash) sale prices takes place at start $t + 1$.
 4. Net assets at start $t + 1$ equivalent to 1 unit of stock (at credit price).
 5. Dividend, 100% of net income, paid at start of following period.

¹²The ASC in its Guidance Notes to SSAP 16 recommends that profit should be excluded from output prices (ASC, 1980b, para. 96). Assuming the assumptions of the PCM model are met, a firm that finances its inputs and outputs with credit will report zero MWCA since, with profit excluded, the output price by definition equals the sum of input prices. Where the method of financing inputs (the proportion of cash and credit used) differs from that used to finance the firm's output, a MWCA will result, in a period of changing prices, if SSAP 16 procedures are followed, as Exhibit IV demonstrates.

cash shortfall of £1025 at the start of $t + 2$ (liquid assets of £13,530 to meet liabilities of £14,555).¹²

In sum, there is no need for a MWCA given a PCM objective and inclusion of a MWCA will misstate income. Note that this conclusion only holds if the assumptions of the PCM model are met. A key assumption in that model is that there is no interruption in the manufacturing/trading cycle. Thus a lag between sale of inventory and its replacement or, more generally, a temporary

switch between inventory and financial assets represents a breach of the model's assumptions. It then no longer follows that allowing for the effect of changing prices on physical assets alone in determining distributable income will ensure the maintenance of the firm's physical capital. In these circumstances a monetary adjustment may well be needed to achieve the PCM objective.¹³

A further implication, namely the difficulty of interfirm comparisons, follows from the previous discussion. Firms that are identical in every way, save for the way they pay for their inputs and charge for their outputs, will issue financial statements which differ in key respects. In particular, the figures shown against 'operating income' will not be the same.

Maintenance of an enterprise's physical capital is an objective consistent with an entity approach to income measurement.¹⁴ The entity view emphasises the operating performance of the company. It is the return on total assets that is of concern. How the assets are financed, whether by short or long-term debt or by equity, is irrelevant to an assessment of the profit which those assets earned. Thus under a PCM objective, operating income assumes crucial importance as the measure of performance of the enterprise.¹⁵ Yet, as was seen in Exhibits II and III, under existing accounting practice, operating income will vary, even for otherwise identical companies whose *net income* figures are the same, depending on whether inputs (outputs) are purchased (sold) with (for) cash or credit.

It is not just intra-industry comparisons that are affected. A move from an FCM (financial capital maintenance) to a PCM objective (and thus a switch of attention from net income to operating income) can alter perceptions about the relative profitability of different industries or sectors. Consider two industries *M* and *N*: both rely on trade credit to finance their input but they differ markedly in the proportion of their respective sales which are made on credit. The operating profitability of industry *N*, which does not offer extensive credit facilities to its customers, will appear lower than that of *M*, even in a period of stable prices, since the implicit interest expense in

credit purchases is not fully offset by sales-related implicit interest income. Thus comparison of the operating profitability of manufacturing and retail firms is vitiated unless corrections are made for differences in the proportion of sales and purchases made with credit.

The nature of the correction has already been suggested. The interest element implicit in the credit price can be excluded in determining both sales revenues and the costs of inputs consumed in generating those revenues. In other words, the term 'operating profit' can be standardised by computing it on a cash basis for all firms. The financing component of credit input and output prices can be accounted for either as interest expense and income or as discounts lost and forfeited.

Despite the attraction of such adjustments for intra- and inter-industry financial analysis, the bookkeeping costs of producing the numbers may well be enough to outweigh the benefits from the information. An alternative and less costly approach is for firms to disclose each financial year the proportions of their inputs purchased and outputs sold on credit. Physical capital maintenance would then be defined for each firm in relation to its existing use of cash and credit. Financial statement users can assess the extent to which a firm's operating profit need be adjusted for any change in the cash/credit mix of financing its inputs and outputs.¹⁶

Summary and extensions

In this paper, the concept of physical capital maintenance has been explored in the context of a credit economy. A distinction was drawn between a product's credit price and its cash price. It was argued that the former is equivalent to the cash price plus a financing charge. In many cases, the financing charge (and therefore the cash price) is not disclosed and must be derived using information about the average credit period taken by a firm's customers, their average credit-worthiness and, by extension, the opportunity cost to the firm of granting them credit.

A major finding of the paper is that the same results hold in a credit economy as in a cash economy: the physical capital of a firm that distributes all of its reported earnings can only be maintained if the current cost of inputs consumed is charged against revenues. In a credit economy, 'current cost' is measured in terms of credit prices and, by extension, physical capital is expressed in credit price terms also. One implication of these findings is the inappropriateness, under certain conditions, of any monetary adjustment in assessing the firm's PCM-based operating performance. The credit price contains a built-in mechanism to allow for the cost of financing the increase in debtors in a period of rising output prices.

¹³I am grateful to the anonymous reviewers for helping me clarify my thinking on this issue.

¹⁴See Gynther (1966), pp. 44–45.

¹⁵For an illustration of this point, note the distinction made in the ASC's SSAP No. 16 between current cost operating profit and current cost profit attributable to shareholders (ASC, 1980). Lee (1980) notes how the focus of UK inflation accounting proposals has come almost full circle—from a proprietary view (PSSAP No. 7) to an entity one (Sandilands Report) to the present mixed approach.

¹⁶Should the *existing* mix of cash and credit trading be used—or the planned mix? How should the average costs of credit granted, credit given be computed? These are technical issues, discussion of which lies outside the purview of this paper.

These results are generalisable. They apply when specific prices are falling. They apply also when general prices are changing: in this case, physical capital, valued at the current credit prices of inputs, is measured in constant pounds.

The analysis in this paper indicates that the distinction usually drawn between the operating and the financing activities of the firm is often blurred. One avenue for further research would be to investigate the accounting and reporting implications of the relationship between trade credit and debt financing in general. In particular, the effects of changing asset prices on the measurement of PCM-based (and FCM-based) income need to be examined under (at least) two sets of circumstances: first, when interest rates change and, second, when the financing mix (trade credit versus other sources of capital) alters.

In the previous section, I discussed the problem of inter- (and intra-) industry financial comparisons where credit usage differs across firms. Comparisons of operating performance are also vitiated by changes in the mix of interest-bearing debt and trade credit for any one firm over time and by differences in the mix across firms. It may be that the possible solutions to this problem are also similar: either exclude all financing charges (including implicit charges) from operating profit or require the disclosure each year of the proportionate usage of credit by the firm (purchases of inputs) and its customers (sales of the firm's output).

With regard to interest rate changes, the work of Kaplan (1977) and Revsine (1981b) is germane. They argue that gains or losses from holding debt (which accrue to the shareholder, not the firm (Revsine 1981b)) arise as a result of *unexpected* changes in the interest rate on the debt. By analogy, changes in market interest rates can give rise

to gains or losses for credit-using firms—but only under two conditions. First, credit prices (or, more generally, credit terms) must be fixed in advance of the sale and, second, the change in interest rates must not have been anticipated by the vendor. It follows that the market value of *outstanding* trade debts only is affected by an unexpected change in interest rates (since the credit prices of future sales will be adjusted to reflect the new rates). It also follows that, when the unexpected change is upwards, existing debtors will seek to lengthen the period of credit taken.¹⁷ Empirical confirmation of this represents yet another possible extension of the paper.

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¹⁷Unless the credit price contains a variable financing element (e.g. a variable cash discount), it is unlikely the opposite phenomenon will be observed. The asymmetry arises because, in most contracts, the credit price is fixed at the time of sale. Thus, when interest rates are falling, debtors cannot reduce the cost of existing trade debts by borrowing at a lower rate to repay them early.

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A Behavioural Investigation of Alternative Methods of Financing Capital Acquisitions and Lease Capitalisation

Trevor Wilkins

Accounting policymakers, academics and various groups of users and preparers of financial statements in various countries have been, and still are, concerned with the question of whether financial leases should be capitalised and supported by supplementary footnote disclosure as an alternative to the same information being disclosed solely in notes to the financial statements. The related question of whether financial leases and term loans are considered by lenders to be an equivalent form of debt financing has also been extensively debated in the finance and accounting literature for many years.¹ This paper presents further empirical evidence on these two related issues. Specifically, a field experiment was conducted to investigate whether bank loan officers make different term loan decisions or loan default predictions when presented with financial statements that (a) account for financial leases differently, or (b) report that firms are financing by term loan rather than by financial lease.

Hypotheses

While academics and accounting policymakers have devoted considerable attention over the last decade to perceived credit-worthiness advantages of footnote disclosure and other asserted advantages of lease financing over alternative debt financing, professional banking and internal bank literature suggest these issues are of little concern to lenders. As commercial banks have been writing financial leases for a number of years, either directly or through leasing subsidiaries, this is not altogether surprising. The following statements

taken from this literature are typical examples which indicate that bankers are well aware of (a) the negative impact of non-capitalised financial leases on an applicant's leverage ratios; and (b) the equivalent impact of financial leases and other similar forms of debt financing on financial risk and borrowing capacity.²

1. . . . 'The most important aspect of this statement (FASB No. 13) is formal recognition that leasing is really a form of debt financing and the right to use property is really an asset. Both leasing and debt financing involve contractual obligations to make fixed payments for a specified period of time. Both have a comparable impact on a company's subsequent ability to finance, because both result in fixed charges, which are a determinant of financial risk. Since in the economic sense, leasing and conventional debt financing are substantially the same, logically they should receive the same accounting treatment. . . . Inasmuch as most analysts and lenders already consider leasing to be a debt equivalent, this statement will not cause a tremendous upheaval in the financial community'. (*Financial Advisor*, Winter 1977).
2. . . . 'A comment sometimes heard in financial circles is that companies turn to leasing when they are unable to borrow directly to finance the expansion or replacement of assets. . . . This statement is viewed as a contradiction by some, however, because lenders tend to view many lease commitments as substantially

¹For an extensive review of the literature and a summarisation of the various accounting standards, pronouncements and exposure drafts on lease accounting which have been issued in a number of countries, see Trevor Wilkins and Ian Zimmer, 'The Effect of Leasing and Different Methods of Accounting for Leases on Credit Evaluations', *Accounting Review*, October 1983, pp. 749-763, and 'The Effects of Alternative Methods of Accounting for Leases—An Experimental Study', *Abacus*, June 1983, pp. 64-75.

²Further examples of similar statements are contained in Unger, 1976; Gill, 1980 and *Financial Advisor*, Winter 1980. Similar remarks were also found in training manuals provided by a number of American and Australian banks. As these were made available on a confidential basis, specific citations cannot be provided. However, the general theme of these manuals stresses that lease obligations should be treated in the same manner as debt obligations in appraising a company's capacity to service additional debt or in designing restrictive covenants. Explicit guidelines for capitalisation of financial leases were often provided in these manuals.

equivalent to debt'. (Asebrook and Seifert, 1979).

3. ... 'We continue to feel, as we did in April, 1978, that "rental payments under long-term leases are fixed contractual obligations similar in nature to term debt and should be included in any calculation of debt-service capacity" and that "operating leases, like short-term debt, need not be included". Contractual obligations should be thought of as fixed cost and operating leases as variable costs, more readily adjusted and related to sales or production volume. FASB No. 13 has more clearly defined the distinction between operating and nonoperating (capital) leases ...' (Strait and Zautra, 1980).

Interviews, attitudinal evidence (Wilkins and Zimmer, 1983b, p. 760) and some empirical evidence (Wilkins and Zimmer, 1983b; Leftwich, 1983) support these suggestions and statements.³ The apparent concern of loan officers is that sufficient 'cash flow' information about an applicant's lease obligation is disclosed in the financial statements. This discussion suggests the following hypotheses about loan officers:

1. Loan default predictions for given term loan amounts are inversely related to 'real' levels of financial gearing.
2. Term loan amounts that are willingly lent to corporate loan applicants are inversely related to 'real' levels of financial gearing.
3. Loan default predictions for given term loan amounts are the same regardless of the method of accounting for financial leases.
4. Term loan amounts that are willingly lent to corporate loan applicants are the same regardless of the method of accounting for financial leases.

³Leftwich's (1983) survey of accounting measurement rules that are negotiated in private corporate lending agreements found that financial leases are usually capitalised according to specified rules and formulae.

5. Loan default predictions for given term loan amounts are the same regardless of whether the applicant finances new capital acquisitions by term loan or by financial lease.
6. Term loan amounts that are willingly lent to corporate loan applicants are the same regardless of whether the applicant finances new capital acquisitions by term loan or by financial lease.

Method

Experimental Design

Loan officers evaluated hypothetical loan applicants that had been constructed as realistic cases. They were assigned to one of three groups. Each group received identical applications except that the financial statements provided to group one included capitalisation of financial leases and footnote disclosure according to SFAS No. 13; those provided to group two confined lease disclosure to footnotes; and those provided to group three indicated that debt financing was by term loan rather than by financial lease. It is emphasised that the information presented to groups one and two differed only in form of presentation. The same information provided (by capitalisation) in the financial statements for group one was provided in the footnotes of the statements for group two.

In order to assess loan officers' reactions to differential gearing levels (term loan or financial lease), the financial statements were constructed so that one company would be perceived as 'moderately geared' and the other as 'highly geared'. The experimental design is illustrated in Table 1, with 39 subjects in each group.

Each subject was asked to make a dichotomous prediction as to whether ABC Company would default on a (5 year) term loan of 10 million Singapore dollars (£3.4m) and whether the XYZ Company would default on a (5 year) term loan of

Table 1
Experimental design

	<i>Group 1</i> <i>[21 usable</i> <i>responses</i> <i>(53.8%)]</i>	<i>Group 2</i> <i>[19 usable</i> <i>responses</i> <i>(48.7%)]</i>	<i>Group 3</i> <i>[20 usable</i> <i>responses</i> <i>(51.2%)]</i>
ABC Company (<i>'moderate'</i> gearing)	SFAS No. 13 Capitalisation and footnote disclosure	SFAS No. 13 Footnote disclosure	Debt financing of all fixed assets
XYZ Company (<i>'high'</i> gearing)	SFAS No. 13 Capitalisation and footnote disclosure	SFAS No. 13 Footnote disclosure	Debt financing of all fixed assets

Table 2
Design differences between the Wilkins and Zimmer study and the present study

	<i>Wilkins and Zimmer</i>	<i>Present</i>
<i>Procedures</i>		
Questionnaire distribution	Completed in presence of researcher. Protocols provided concurrently by subjects performing experimental task	Delivered to subjects' banks and returned anonymously by post
Elicitation of attitudes to lease accounting and financing	Direct questioning of each subject by researcher following completion of experimental task	Post-experimental discussions and perusal of working papers and returned questionnaires
Response rate (usable)	98%	51%
Average time to complete questionnaire	38 minutes	90 minutes
<i>Subjects</i>	52 loan officers from 35 banks	117 loan officers from 75 banks
<i>Experimental Tasks</i>	1. Assess repayment ability of two term loans of S\$5m and S\$1m 2. Maximum amount loaned	Predict loan default/non-default of two term loans of S\$10m and S\$3m and level of confidence in predictions Maximum amount loaned
<i>Data</i>		
Financial statements	Summarised and abbreviated notes to accounts	Full notes to accounts presented according to Singapore Companies Act and Singapore Society of Accountants disclosure recommendations
Term loan applications	4-year secured by fixed and floating charges	5-year secured mortgage

three million Singapore dollars (£1.0m).⁴ Subjects were also asked to give a scaled estimate of their degree of confidence in each prediction and to state the maximum amount they would be willing to lend to each corporation.⁵

⁴Loan amounts for which default predictions were requested were different (the amount for the highly geared applicant being less than for the moderately geared applicant) in order to encourage subjects to think of the respective loan applications as being completely different. Pilot work had indicated that these requested loan amounts were realistic for each company. Loan officer consultants had also advised that the 'powerful' difference between the two companies would be the difference in gearing, that the highly geared company would be considered too risky to obtain a loan at some lending institutions, and that the differences in loan amounts would not materially affect the risk assessment.

⁵Although the banking literature and interviews with loan officers indicate that financial statements are primarily used to predict loan default (also termed 'assess ability to repay') several published papers have used 'maximum amount loaned' as an experimental task (see, e.g. Oliver, 1972; Abdel-khalik, 1973; Firth, 1979). In view of the discrepancy between the academic accounting and professional banking literature, it was decided to include both 'predict loan default' and 'maximum amount loaned' tasks in the experiment and to test for correlations between them.

Differences in experimental design between the Wilkins and Zimmer (1983b) (hereafter WZ) study and this study are presented in Table 2. Some of the more important differences should be emphasised. The present study was designed to parallel as closely as possible the loan officer's usual decision-making environment. Whereas the subject loan officers supplied tape-recorded verbal protocols while completing the experimental task in the presence of one of the two researchers in the WZ study, in this study the research instrument was delivered to the subjects, who completed the task in their own time and returned the completed questionnaires by post to ensure anonymity. Further, because of the time constraint in completing the task face-to-face, WZ necessarily had to use abbreviated and summarised experimental cases and financial statements. This study was able to present more realistic and representative case materials and financial statements (including complete notes to the accounts) in a form which was typical of that normally used in Singaporean financial statements. Maximising representativeness and realism had the necessary trade-off with non-response rate.

Whereas WZ's study had a 98% response rate, the present study achieved an overall (usable) response rate of only 51%.

Second, WZ's study used a much smaller sample. In the present study 117 loan officers from 75 different full licence, restricted licence, offshore licence and merchant banks operating in Singapore received the research instrument. WZ's sample consisted of 52 loan officers, many of whom were expatriates, from predominantly international and offshore banks.

Third, the present study used different term loan amounts and repayment periods, as well as using one different task variable. Replication across different subjects and/or information sets is important for drawing conclusions or generalisations about human information processing in accounting (Libby, 1981; Ashton, 1982).

Development of Research Instrument

The material provided to subjects included:

- (1) A covering letter with instructions and details of a hypothetical loan application from the ABC and XYZ companies.
- (2) Three years of audited sets of financial statements (including complete notes to the accounts) for each of the two companies.
- (3) Descriptive background information about the ABC and XYZ companies. This included most of the information normally requested by loan officers in a real lending situation.⁶
- (4) A questionnaire which asked loan officers to indicate the maximum amount they would lend to each company, to predict whether the two companies would default on loans of specific amounts, and their levels of confidence in their respective loan default predictions.

The two companies were described as being engaged in the manufacture and sale of domestic electrical products. This industry was chosen because a high proportion of loan officers in Singapore have had experience with term lending to companies in this and similar light manufacturing industries. Several steps were taken to make the cases as realistic as possible and to maximise the representativeness of the task. Internal bank training and professional banking literature were reviewed in order to determine what other non-accounting information is normally requested from loan applicants in real term-lending situations. Two experienced loan officers, one a vice-president

of an international bank and the other a general manager of a medium-sized finance company, were interviewed several times for this purpose. After a preliminary research instrument had been developed in consultation with these officers, it was pilot tested in an international bank's credit department in order to ensure that the materials were considered realistic, and as a final safeguard against ambiguities.

Sufficient information was given to enable the loan officers to calculate the expected return from the loan and to form an assessment of the respective companies' abilities to repay the loan obligations. The loan application was for a long-term loan, rather than a short-term loan, as many of the financial measures considered by a loan officer for a short-term decision would not be significantly affected by long-term leases (Backer and Gosman, 1978).

With the exception of the SFAS No. 13 lease capitalisation and disclosure requirements, the financial statements were presented according to the Singapore Companies Act Ninth Schedule requirements and the Singapore Society of Accountants disclosure recommendations.⁷ The wording of the notes to the accounts and the audit report was typical of that normally used in Singaporean financial statements. Financial ratios published by Dun and Bradstreet, and an analysis of actual annual accounts of a number of companies engaged in the manufacture and sale of electrical appliances in Singapore and Malaysia, were used as a basis for construction of the financial statements of the 'moderately' geared (ABC) company. The highly geared (XYZ) company was created by taking the financial statements of the ABC company, increasing the degree of financial gearing, and making other non-material changes to the financial statement numbers. Gearing ratios extracted from the most recent year of the three years of financial statements supplied under the three treatments are shown in Table 3.

The compilation of financial statements which differed in respect of lease commitments *vis à vis* 'equivalent' term loan finance was a problem, as cash flow patterns of 'real' leases are not precisely the same as those for conventional term loans. This is especially so when relatively large residual values are involved as leasing avoids financing residual values whereas term loan financing does not. Differences in cash flow profiles (and resulting debt to equity ratios) of the alternative methods of financing were allowed to persist in order closely to simulate real situations. However, in order to even out these differences over time, a number of steps were taken. First, the rates of interest charged on both the term loans and financial leases were

⁶Brief information was given on the companies' activities (production and sales), inventories, customers, market situation, past growth rate, capital contribution and dividend record, ownership and control, management, future outlook and management objectives. This was constant for both firms, although it was phrased differently to encourage subjects to perceive the two loan applications to be completely different.

⁷Singaporean accounting standards follow pronouncements issued by the International Accounting Standards Committee.

Table 3
Gearing ratios

	<i>Debt Financing</i>	<i>Capitalisation</i>	<i>Footnote</i>
<i>ABC Company</i>			
Total Debt-Equity	1.1	1.0	0.7
Long Term Debt-Equity	0.5	0.2	0.1
<i>XYZ Company</i>			
Total Debt-Equity	2.8	2.9	2.1
Long Term Debt-Equity	1.4	1.2	0.7

identical, and future interest rates on the term loans were 'fixed' until after the expiry of the lease periods. Second, the footnotes to the 'lease' financial statements stated that the residual values of the leased assets at the end of the respective lease terms were expected to approximate realisable values, and that the respective companies' managements expected that leases would be renewed or replaced by other leases in the normal course of business. Given these procedures it was not expected that the marginal difference between methods of financing would affect responses.

Subjects and Procedure

One hundred and seventeen loan officers, who were experienced in corporate lending, received the research instrument. Subjects were employed by 75 different full licence, restricted licence, offshore licence and merchant banks operating in Singapore.⁸ Each bank provided from one to five subjects. Envelopes containing the research instrument were delivered to subjects who were requested to return the completed forms by post to ensure anonymity.

The task was completed at the place of work of each subject. In order to avoid sensitisation, any two or more subjects employed by the same institution were assigned to the same group; and the various bank/credit managers who were responsible for assigning such subjects to complete the questionnaire were requested to instruct their employees to work independently. In view of the high salaries paid to loan officers in Singapore, it was not feasible to provide financial incentives to subjects. Further, as there was no way of validating responses, no recognition of good performance could be offered. Nevertheless, subject interest in the task, as evidenced by submission of working papers and requests for analysis of the overall project's results, suggests that the exercise was not

approached lightly. Average time taken to complete the task was 90 minutes.

Post-experimental discussions with a number of the subjects and perusal of stated reasons for loan default predictions and lending decisions on returned questionnaires, also indicated that the case materials and loan default prediction task were considered realistic. Some stated that they found the 'maximum amount loaned' task 'difficult' as they are never asked this question. Others stated that while they are not asked this specific question, an assessment of an applicant's maximum creditworthiness is still (implicitly) made when considering the financing of a specific proposition.

Table 1 shows the (usable) response rates for each sample group, and indicates that differences in response rates between groups were not material (four questionnaires were rejected because not all the tasks had been completed). Moderate non-response is unlikely to be a problem in most types of multi-group comparisons when response rates are approximately the same between groups (Kish, 1965).

In order to examine whether there was any significant non-response bias, differences in maximum amounts loaned and default/non-default predictions (expanded to incorporate confidence) between the first 41 responses and the last 18 responses were tested using Student's *t*-test. Differences were insignificant in both cases, indicating that there may be little non-response bias (Oppenheim, 1966) (see also Armstrong and Overton, 1977 and Scott, 1961).

Results

In order to minimise the problem of violations of assumptions necessary to the analysis of variance (Hays and Winkler, 1975) two subjects from treatment group 1 and one subject from treatment group 3 were randomly dropped.⁹ The analysis was then conducted using three treatment groups of 19 subjects each.

Differences in default predictions were analysed by converting the dichotomous default/non-

⁸In the last decade, Singapore has developed into one of the world's leading financial and banking centres, with most of the top hundred banks in the world represented in the republic. As a city, Singapore ranks fourth in the world in terms of banks present, next only to London, New York and Hong Kong (Tan, 1981).

⁹Cochran's test for homogeneity of variance was not significant ($p > 0.05$).

Table 4
Analysis of variance summary

<i>Source</i>	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance</i>
<i>Dependent Variable: Confidence Scaled Default Predictions</i>					
<i>Between-subjects</i>					
Methods of Financing or Reporting Leases	2	3.438	1.719	0.571	0.568
Error-between	54	162.315	3.005		
<i>Within-subjects</i>					
Leverage	1	12.666	12.666	5.392	0.024
Interaction	2	0.491	0.245	0.104	0.901
Error-within	54	126.842	2.348		
<i>Dependent Variable: Maximum Amount Loaned</i>					
<i>Between-subjects</i>					
Method of Financing or Reporting of Leases	2	127.631	63.815	1.463	0.241
Error-between	54	2355.473	43.619		
<i>Within-subjects</i>					
Leverage	1	4200.561	4200.561	108.684	0.000
Interaction	2	45.385	22.692	0.587	0.559
Error-within	54	2087.052	38.649		

default prediction with three levels of confidence to a six-point scale ranging from 1 (= very confident of default) to 6 (= very confident of non-default). Using this dependent variable, the effect of the different methods of financing or reporting of financial leases and the effect of differential gearing were analysed using a two-factor ANOVA with repeated measures on the gearing factor. A similar analysis was carried out using maximum amount loaned as the dependent variable. Table 4 reports

analysis of variance summaries. Table 5 reports means and standard deviations for each cell.

A contingency table analysis was conducted to investigate differences in default predictions among the three treatment groups. Differences were insignificant in respect of both the ABC Co. (Chi-square = 1.22; $p = 0.54$) and the XYZ Co. (Chi-square = 0.42, $p = 0.81$). Frequency of default/non-default predictions within each of the three groups is shown in Table 6.

Table 5
Cell means & standard deviations

	<i>Capitalisation</i>		<i>Footnote</i>		<i>Debt financing</i>	
	<i>ABC Co</i>	<i>XYZ Co</i>	<i>ABC Co</i>	<i>XYZ Co</i>	<i>ABC Co</i>	<i>XYZ Co</i>
<i>Dependent Variable: Confidence Scaled Default Predictions</i>						
Mean	4.32	3.47	3.89	3.37	4.37	3.74
Standard Deviation	1.76	1.74	1.49	1.83	1.38	1.56
<i>Dependent Variable: Maximum Amount Loaned (Sing \$ million)</i>						
Mean	8.21	1.45	6.53	1.29	8.26	2.05
Standard Deviation	4.66	1.59	3.82	1.43	4.19	1.81

Table 6
Frequencies of default/non default predictions

<i>Company</i>	<i>Group 1—Capitalisation</i>		<i>Group 2—Footnote Only</i>		<i>Group 3—Debt Financing</i>	
	<i>Default</i>	<i>Non-Default</i>	<i>Default</i>	<i>Non-Default</i>	<i>Default</i>	<i>Non-Default</i>
ABC	5	14	7	12	4	15
XYZ	8	11	10	9	9	10

A further contingency table analysis to test for differences in frequency of default/non-default predictions between the highly geared and moderately geared companies was conducted. As expected, results indicated a significant difference (Chi-square = 4.51, $p = 0.03$).

The results of our analyses are consistent with the six null hypotheses. They indicate no association between credit decisions and method of financing fixed assets or accounting treatment of financial leases. Indeed, inspection of cell means indicates that directions were inconsistent with assertions of greater credit availability as a result of leasing. Loan officers did respond differently to differences in 'real' gearing, with all three groups perceiving the highly geared company as a risky proposition. This conclusion is only tentative as the two companies differed in amount of funds sought as well as financial gearing. However, we conclude that this was a 'gearing effect' because it was observed across both tasks, and an 'amount of funds sought' effect would have been in a direction opposite to that observed.

It was suggested earlier that although the majority of studies of loan officer behaviour have used 'maximum amount loaned' as the task variable, professional banking literature suggests that this task is inappropriate. This literature suggests that the prediction of loan default, or assessment of ability to repay, may be more representative. In this experiment, alternative task variables made no material difference to the results, and there were high correlations between the amounts that subjects would be willing to lend and the six-point default prediction (for the ABC Co., Pearson's $r = 0.63$, $p < 0.001$. For the XYZ Co. Pearson's $r = 0.76$, $p < 0.001$).

Discussion and conclusions

The results indicate that loan officers respond differently to different levels of financial gearing of profitable companies, but not to different methods of fixed asset financing or reporting of financial leases. These are consistent with the results of the WZ study.

The finding of no effect resulting from different methods of accounting for financial leases in this study is consistent with three propositions. First, the loan officers who received statements including capitalised leases may have eliminated the unfamiliar asset and liability, thereby making their information set similar to those received financial statements that disclosed lease commitments by footnote. Second, neither of these groups may have given any attention to the lease related data. Third, as the loan officers have knowledge of SFAS 13, and are trained to request information regarding lease commitments, those that received financial statements that confined disclosure of lease com-

mitments to footnotes are likely to have adjusted financial statements so as to capitalise the lease commitments. Since the groups that received the statements indicating substantial lease finance did not respond differently to those that received statements indicating only term loan finance, the last proposition is more likely. This is also consistent with post-experimental discussions with subjects, with inspection of working papers that were voluntarily submitted by some members of the 'footnote only' group, and with stated reasons for specific responses on returned questionnaires. Loan officers apparently treated the lease items (whether capitalised or disclosed only in footnotes) as 'debt', and reacted similarly to the high (term loan or leasing) gearing of the XYZ Company. It appears that the loan officers either physically or implicitly adjusted the 'footnote' financial statements and thereby reached the same conclusions as those in the 'capitalisation' and 'debt financing' groups.

As with most studies that report 'no difference' between treatments, results are also consistent with the possibility that the design used was not sensitive enough to detect differences. Although directions of cell means support the proposition that the result was not an artifact of a lack of statistical power, the possibility remains that a stronger design may detect differences inconsistent with our hypotheses.

Results may also have been affected by the nature of the information provided and the choice of 'within' *vis à vis* 'between' subject analyses. The companies presented had good profit records, and the 'levels' of the within-subjects factor, financial gearing, were more extreme than the 'levels' of the between-subjects factor. Therefore, replication of the study across different subjects and information sets is appropriate.

Like all experiments, the one reported here has limitations. In particular, it is stressed that the results cannot be generalised to cases where less information is disclosed by footnote than would be disclosed by the capitalisation technique. The post-experimental discussions with subjects and inspection of working papers indicated that the descriptive and cash-flow information provided in the notes to the financial statements was used in gearing assessments and in subsequent cash-flow projections, credit evaluations and decisions.

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Operating System Audits: Their Importance and Use

David J. Williams*

Introduction

Recent studies have indicated that many operating systems are unable to prevent moderately knowledgeable users from having complete and undetectable access to any information stored on a computer system. The operating systems of most major vendors have already been compromised by unauthorised users. (See for example, Enger and Howerton, 1980, p. 144; Theodore, 1980, p. 80; Donovan and Madnick, 1974, p. 189; Parker, 1975, p. 25.) The possibility of unauthorised manipulations of an operating system is disturbing because it typically controls all system facilities, hardware and operations, so that breaching operating system integrity enables the control of all data and software supported by the operating system. The problems of securing the operating system are therefore of a higher order than the problems of securing the applications software and hardware (Burch and Sardinas, 1977, p. 107; Comer and Jacobson, 1980, p. 2). The importance of this in relation to the overall computer system has been widely recognised in the area of computer science (see for example, Hemphill and Hemphill, 1973, p. 96; Lister, 1979, p. 1; Whiteside, 1978, p. 156). A few writers have extended this security concern to its potential effects on accounting and auditing (see for exceptions, Burch and Sardinas 1977, p. 106; Weber, 1982, p. 317; Coopers and Lybrand, 1981, p. 68; Williams *et al.* 1983).

Despite these concerns, there is little accounting or auditing literature available on operating systems. An examination of computer accounting and auditing texts used in Australian educational institutions reveals that concern is concentrated on the design and audit of applications software. It appears that accounting graduates are not realising the importance of the operating system. Similarly, the audit profession has conducted little research towards developing an effective methodology for the audit of operating systems (Weber, 1975, p. 100). It may be possible that auditors have assessed the risks associated with operating system

security as too low because of inadequacies in their own education, experience, and firm supplied research.

This paper demonstrates why a knowledge of operating systems is important for EDP audits. It also reports the results of an examination of characteristics of Australian companies that auditors may find relevant in determining whether their current treatment of operating systems is adequate. Anonymous questionnaires were sent to the EDP managers or, in their absence, to the chief accountants of Australia's largest 200 public companies as at 1 April 1983. Responses were received from 102 (51%) of the participants. Seventy respondents (35%) completed the questionnaire and had between them 109 computer system installations. Of the remaining 32 respondents (16%), nineteen (9.5%) respondents had manual accounting systems, 4 (2%) had their financial accounting performed by a bureau, and 9 (4.5%) did not answer for reasons of confidentiality, lack of expertise, or new systems. Because the survey was entitled 'Operating System Audit and Security Survey' a response bias was expected in favour of companies preparing financial accounts by computer.

The survey also sought to identify the extent to which auditors currently audit operating systems. Four questions were asked regarding broad audit approaches to the operating system. These questions were (i) whether auditors compare a 'clean' version of the operating system with that currently running the installation, (ii) whether they check amendments to the operating system or the corresponding documentation and authorisation, (iii) whether they perform physical control checks in and about the operating system and computer, (iv) whether they perform any other audit testing related to operating system security. Participants were asked to indicate whether these audit approaches had been adopted by external or internal auditors on each computer installation. The results are presented in Table 1 and are consistent with expectations that operating system audits attract little practical interest. With the exception of physical control checks in and about the operating system, little auditing is performed. Moreover, the number of installations with physical control checks performed by external auditors (50,

*With the usual caveat, comments and discussion from Anne Lillis, Ron Weber and participants in workshops at Glasgow and Monash Universities is gratefully acknowledged.

Table 1. Current audit practice

		Code comparison, external audit	Code comparison, internal audit	Physical control checks, external audit	Physical control checks, internal audit	Checking amendments documentation, external audit	Checking amendments documentation, internal audit	Other tests, external audit	Other tests, internal audit
Yes	Installations	2 (1.8)	0 (0)	50 (45.9)	24 (22)	12 (11)	8 (7.6)	10 (9.1)	5 (4.6)
	Companies	1 (1.4)	0 (0)	33 (44.0)	16 (21.3)	8 (10.5)	6 (7.9)	6 (8.6)	3 (4.3)
No	Installations	99 (90.8)	99 (90.8)	51 (46.8)	69 (63.3)	79 (72.5)	81 (74.3)	87 (79.8)	86 (78.9)
	Companies	64 (90.2)	63 (88.7)	37 (49.3)	48 (64.0)	53 (69.7)	53 (69.7)	56 (80.0)	54 (77.1)
Unknown & no answer	Installations	8 (7.4)	10 (9.2)	8 (7.3)	16 (14.7)	18 (16.5)	20 (18.4)	12 (11.1)	18 (16.5)
	Companies	6 (8.4)	8 (11.3)	5 (6.7)	11 (14.7)	15 (19.7)	17 (22.4)	8 (11.4)	13 (18.6)

Note: Numbers in brackets are percentages. Company observations may aggregate to greater than 70 because responses were counted if respondents gave different answers for multiple installations.

i.e. 45.8%) and internal auditors (24, i.e. 22%) is surprisingly low based on the assumption that this is the least auditors might be expected to perform. However, concern about this evidenced level of auditing should be constrained by the risks associated with operating systems.

Audit risk—high or low?

The lack of attention that the auditing profession and academics have given to operating systems may have been caused by the educational programs used. While most educational institutions now expect accounting students to be competent in at least one programming language, operating systems are written in a lower level language which is typically unfamiliar, difficult to learn, and machine dependent. Language comprehension is lowered by the complexity and formidable size of even small operating systems (Weber, 1975, p. 106).¹

Audit education and practice are presently such that, in the main, auditors are ignorant of the central role of the operating system and therefore of the risks. For those auditors who have some awareness, the operating system offers two areas of potential concern:

- (i) design deficiencies in manufacturer supplied software,

and

- (ii) unauthorised access to system resources or company assets by manipulating the operating system.

The author's experience, reflected in evidenced practice, is that auditors regard both as low risk concerns.

With regard to design deficiencies, Comer and Jacobson (1980) note that most operating systems are subject to a continuing 'refinement process' whereby from time to time the manufacturer will add enhancements to the software and simultaneously correct design defects discovered after the sale of the original system. In the Australian survey, 90 installations (82.6%) had received one or more updates in the previous year, with 29 of these (26.6%) receiving in excess of three. This refinement process increases the reliability of the operating system only if firms receive updates. For cost/benefit reasons some firms choose not to receive updates. In any case, from the evident lack of auditing performed on operating systems, it appears that auditors perform only limited checking on updated versions of clients operating systems. Some auditors claim to check the operating system when it is installed (see for example *Accounting Bulletin*, 1983). If this is seen as important, updated versions should also be checked.

In addition to this continuing refinement process, auditors might offer, as evidence of low risk, the increasing tendency to hardwire the operating system, ensuring that manipulations will require the replacement of circuitry. However, without regular oversight by the manufacturer, it is possible that the hardware of the operating system might be

¹The proliferation of BASIC as a teaching language might also be questioned. Sixty-seven per cent of respondent companies currently use COBOL for their financial accounting applications, while 14% use BASIC. Moreover 58% of EDP managers expected to be using COBOL in five years time, whereas only 7% expected to be using BASIC.

replaced, and therefore subverted, 'without too much physical difficulty' (Hyman, 1976, p. 85). A further reason that 'most users and auditors consider the operating system as transparent and ignore its interfaces' (Vanecsek and Scott, 1980, p. 28) is because of the complexity of the operating system. Most auditors prefer the view that the applications software is protected by the operating system which is understood by relatively few and is therefore a protected area (see for example: Chambers, 1981, p. 115, 116; Leintz and Weiss, 1977, p. 18).

This reliance on user ignorance may be dangerous because of the proliferation of computer science courses in tertiary institutions. These courses are producing programmers who have the ability to manipulate operating systems and sometimes to replace circuitry. It has been estimated that there were 50,000 systems programmers and computer programmers employed in Australia in 1981. This represents a five fold increase since 1976 (*Focus*, April 1982). In our survey 80 installations (73.4%) had one or more staff members capable of making changes to the operating system; with 33 of these (30.3%) having three or more staff.

There may be good reasons why educated staff may want to tamper with the operating system. Perceived deficiencies in existing operating systems have encouraged many mainframe users to make modifications to their operating system. In the survey, 29 installations (26.6%) claimed to have made modifications which are still resident in their operating system. On *a priori* grounds, firms making changes to operating systems might be considered more risky than firms not making changes. For this reason, the number of competent staff, and knowledge of whether a client has access to the source code might be considered important variables for an auditor assessing the riskiness of operating systems. In the survey, 30 installations (27.5%) had access to source codes. However, of those installations where user modifications had been made to the operating system, 16 installations (55%) were claimed to have been modified *without* computer centre staff having access to source code. It is apparent that auditor knowledge regarding a client's formal access to source codes may not be the most useful discriminator in determining the probability of modifications and associated risks.

This *a priori* reasoning about the information content of user-modifications advice, source code access, or staff numbers, for auditor risk assessment is apparently not shared by external or internal auditors. In installations with modifications, managers were asked whether operating system changes had ever been checked by an internal or external auditor. Two installations (in the one company) were said to have had changes checked by external auditors. Two further installa-

tions (in the one company) were said to have had changes checked by an internal auditor.

The presence or absence of modifications did not appear to influence the extent of other types of audit tests. For example, 38 (48%) of the 80 installations not subject to modification did have physical control checks performed by an external auditor whereas, of the 29 modified installations, 12 (41%) were subject to audit. With respect to internal audit 18% and 34% of non-modifying and modifying installations, respectively, were subject to physical control audit. These percentages are not cumulative. For example, of the 12 installations receiving external physical control audit, seven of these were also subject to a similar audit by internal auditors. While physical control checks might be argued to be important regardless of whether modifications are made, it may be that physical controls are more critical in installations that have the capacity to modify their operating systems.

The above evidence of the lack of audit interest in operating systems also suggests that auditor reliance on client ignorance is misplaced. Education and 'customisations' encourage systems programmers and engineers to acquire the knowledge and skill to violate the integrity of the operating system. The improvement and sophistication of application program controls, and the increasing audit interest in this area, might further encourage system programmers to work through the operating system, where there is typically less audit concern and surveillance. There may be good reason for auditors to reassess the risks associated with operating systems and to know something about endogenous operating system controls.

In-built security devices

In considering the evaluation of inherent software controls, the auditor confronts the fact that:

there is such a profusion of operating systems and options within those systems that no comprehensive study presently is available which even lists the control features available, much less evaluates them. (Mair, Wood and Davis, 1976, p. 309.)

As a preliminary demonstration of the non-homogeneity of procedures in operating systems, Williams *et al.* (1983) compared selected characteristics and procedures of six mainframe operating systems. That study did not attempt to quantify differences in risk exposure to auditors across machines. It did however identify apparent differences in operating system procedures and characteristics which could be of audit interest. Such differences as do exist must be confronted

before effective operating system audits can be designed. Auditors who acknowledge this non-homogeneity will be encouraged to adopt audit procedures and controls which are less general in nature and more adapted to specific systems, compared to auditors who view operating systems as homogeneous.

We distinguish here between external and internal controls, assuming that auditors are well versed in the former. External controls broadly encompass administrative controls and physical security (see for example, Shankar, 1977, p. 50). However, once external controls are by-passed, the operating system is on its own in preventing unauthorised access. Of course, some controls will additionally be built into the application software (Cornick, 1981, p. 34). Auditors should, as a minimum, be aware of security devices which enable the operating system to control system resources and thereby limit the extent to which users can accidentally or maliciously modify, access or destroy unauthorised data (Donovan and Madnick, 1974, p. 188; Hardenburg, 1980, p. 2).

A typical operating system may contain or be supplied with security devices which help to protect the integrity of the operating system, data files, and computer system, and prevent unauthorised entry from outside or inside the company. Such devices may have the ability to detect unauthorised access to data files, and the ability to establish audit trails for all transactions entered into the system. The auditor should identify these features, document them, note their importance with respect to the integrity of accounting data, and verify their functionality.

Isolation

A security design feature of most operating systems is the concept of isolation (IBM, 1968; Stepczyk, 1974; Weber, 1975; Enger and Howerton, 1980, p. 144). Isolation involves separating the various processes and users of a system from each other to minimise the possibility of unauthorised access to data files. In general, the 'principle of least privilege' should apply. That is, the operating system should grant to users and their required computer processes and procedures the minimum authority needed to carry out required functions, minimising the risk of a user process accessing data for which it does not have the required authority (Stepczyk, 1974). Isolation is performed in two parts. First, the identity of a user making a request must be verified. This internal authentication supports any physical authentication that exists externally. Passwords are perhaps the most widely used technique, but others such as cards and fingerprints are gaining in popularity for internal and external control and authentication. Secondly, the operating system must control the accessing of information by appli-

cation programs in execution (Shankar, 1977, p. 55). Such calls and requests must first be verified by one of a number of access control mechanisms (Hsiao, Kerr and Madnick, 1979, p. 168).

Audit Trails

The creation and maintenance of an audit trail for the verification of specific transactions are regarded as basic functions of any operating system (IBM, 1968, 1980; Weber, 1975, 1982; Burch and Sardinas, 1977; Malcolm and Sardinas, 1978; Hoy and Lamond, 1980). A record should be generated for the auditor of all activities to and from the operating system and any irregularities, such as consistent unauthorised attempts to access certain data files or computer space. An audit trail that generates a time and date record of changes made to an operating system also assists the auditor in identifying possible access violations (IBM, 1980, p. 33; Burch and Sardinas, 1977, p. 111; Mair, Wood and Davis, 1977, p. 325). However, on some machines this information may be difficult to access and interpret.

Generating a console log which records all activities between the console of the computer system and the operating system may deter some users from tampering with the system because of the knowledge that their activities are being monitored. Such situations may be improved by having possible threats to the computer system monitored live as well as maintaining logs for *ex post* verification. Shankar (1977, p. 56) refers to this as the 'real-time or active monitoring, detection and modification of attempted and successful penetrations'. Despite these additional possibilities of detecting, changing and reporting possible system manipulation or penetration, security is improved only if the operating system remains intact. The person who receives real time reports should not be in a position to conduct changes, for example, to amend the operating system to ignore certain penetrations when compiling the console log. Separation of duties is as indispensable here for control as it is in an accounts receivable function of a manual accounting system.

There is vendor supplied software which should be considered indispensable for auditors interested in operating system audit trails. For example IBM's System Modification Program will create and update a control data set, make modifications to the operating system libraries, and generate a log which places a time and date on changes made to the operating system. IBM's VSE/ACCESS Control-Logging and Reporting Program will similarly produce an audit trail report from information stored in the log data set (see for example, Stone, 1975, p. 37). Conversely, it should be remembered that the operating system can also be changed so as *not* to provide this help. System integrity support will not substitute for physical

security, access control over system libraries and files, control over modifications and additions to control programs and utilities.

Requirements of a Secure Operating System

In addition to the security features outlined above, auditors should be aware of other in-built security devices that deal with more technical aspects of system performance. For example, coding or encryption techniques might be employed to safeguard information flows between computer networks and remote terminals. A variety of techniques are also used to guard against hardware malfunctions. These other areas of security concern have been generally reckoned as low risk by computer scientists because malfunctions in I/O equipment are rare.

In designing audit tests, auditors must take into account the goals of system security. For example, five system security goals, extended from the work of Stepczyk (1974), suggest more specific area of audit interest:

- (i) The system must protect itself from users, so that a computer process cannot be terminated, destroyed or changed by user action. For example, it may be possible for a user to take advantage of timing inadequacies in the system to violate operating system integrity. The auditor could test this by requesting an I/O operation. If the system finds the information flow channel is busy, an interrupt may be issued or a halt in the program caused by an external source. Such action requires that control should pass temporarily to another routine, for example, the monitor. The auditor may then change the address for the input/output operation to an address outside the valid workspace. If the operating system returns control to an illegal address, the auditor has sufficient grounds to suspect a design fault in the operating system.
- (ii) The system must protect users from each other and prevent data and programs from being accessed by unauthorised users. The auditor might question how the system prevents system data from entering user areas, and how it relocates such data to protected areas. This problem is perhaps most acute on systems running more than one operating system simultaneously. The most general audit concern, however, is to ensure that unauthorised users cannot by-pass store or fetch protection or password protection.
- (iii) The system must protect the individual user from himself, and the users must be restricted to their respective areas. Users should not be able to take control of the system. The auditor should investigate whether the operating system accepts the address of a protected system control area from the user without validity checks. This may occur when a system does not check the validity of all the attributes of a user's request. The auditor can check for these weaknesses by requesting an address outside the area allocated to his program or workspace. In general, there should be control over access to all system resources. Some user programs, because of the special nature of their function, are allowed direct access to certain system programs and therefore by-pass controls. Such classes of user programs must be differentiated and controlled.
- (iv) The system must be protected from itself such that an infiltration into one element of the operating system should not cause malfunction in the remaining elements. For example, the auditor could investigate whether an unauthorised user, in an attempt to invoke a supervisor call routine, can by-pass some or all validity checking by first accessing an alternative supervisor call routine (McPhee, 1974, p. 239). More generally the auditor should be aware of how the system prevents a routine that is operating on one particular security level from accessing information not allowed to that user routine. This problem can also be extended to routines where part of the operating system's workspace is a subset of the space allocated to a user program. The operating system can read in other users' passwords to this space and therefore the integrity of the operating system is in jeopardy because the passwords can be accessed by the user program.
- (v) The system must be protected from environment risks such as power failure, floods, fire, and other natural hazards. The operating system should have the capability of bringing an orderly halt to operations so that later recovery is possible.

As an alternative to these five goals, Graham (1975) identifies six attributes of operating systems which together are intended to provide a useful framework for auditors to consider differences across systems. However, Graham's six attributes do not necessarily encourage an awareness of procedural differences which may be of audit interest. The above five goals encourage an auditor, when examining an operating system, to identify controls and procedures which may differ across operating systems.

Conclusion

The purpose of this paper has been to bring to the notice of auditors and educators information which will better enable them to assess the risk of

continuing to ignore the operating system. Such information relates to the vulnerability of the operating system to infiltration, the typical auditor's lack of concern regarding security in and around the operating system, and the extent that client EDP staff can and do make changes to operating systems.

The auditor's major concern is to ensure the presence of effective controls and to be aware of user modifications. The most effective way the auditor can undertake to verify the existence and functionality of the controls, is to attempt to violate them himself. The best way of auditing user modifications is to verify their effects. Unless both of these general objectives become an integral part of the overall audit program, auditors may be exposing themselves to unacceptable risks. Auditors who remain unconvinced can gain comfort from the fact that the operating system is so powerful and central to the whole accounting system that considerate infiltrators could tamper with the system in a way that will ensure an audit in "blissful ignorance" (Williams *et al.*, 1983).

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Nationalised Industry Consumer Councils and the Monitoring of Financial Performance

Peter N. Dean*

Consumers and nationalised industry finances

This paper is not about the accountability of nationalised industries in general, but specifically about their financial accountability to consumers: their answerability concerning economic decision-making and resource use. Financial¹ implies that these aspects are expressible in monetary terms, though not necessarily exclusively so. Thus we are concerned with the costs, prices, profits, capital investment programmes and financing of nationalised industries and the way in which they satisfy the legitimate demands of consumers for information on these and related aspects. The obvious and recognised method of doing so is by the publication of audited annual reports, although there are many other methods. In terms of the discussion above, accountability is due to consumers concerning price, quality and standards of service. Consumers are represented by a number of bodies and pressure groups and by formal intermediaries in the accountability process: Nationalised Industry Consumer Councils (NICCs).

There are 47 NICCs, all of which are statutory. Of these, six are national and 41 are regional. Generally they are required to consider the consumer interest, including matters referred to them by consumers and government, and matters they themselves consider important.¹ In 1982 the Department of Trade reported the interim results of its three year review of NICCs and of their roles

in acting on behalf of consumers. That report argued that:

the NICCs can and need to do more...to encourage the industries to develop and publicise performance yardsticks and to publicise the results achieved by the industries in relation to them.

It went on that NICCs:

must ensure that the consumers' view is clearly heard in decisions on costs and prices....The NICCs...have an important role to play alongside the Government itself in encouraging the industries to contain costs (and hence prices); they can thereby make an informed contribution to the improvement of industry efficiency.

The consumer interest in principle

Where there is adequate competition amongst suppliers, the discerning consumer will shift allegiance from one supplier to another in order to get the best bargain. The supplier of the preferred goods will register an increase in sales revenue, and his unsuccessful competitor a decrease. Thus, in a competitive market the preference of consumers will influence the quality, price and types of goods offered for sale. However, to the extent that monopoly exists, the choice of consumers will be restricted. Unable to transfer their allegiance, conditions will be created in which the monopolist can afford to neglect the interests of consumers. For this reason governments establish procedures for the control of private sector monopolies. In the public sector, monopolies also exist but under direct government control. The fact of direct government control does not, however, imply that consumer interests will be automatically protected for the following reasons:

1. Government may pursue a policy of high public enterprise prices, as a method of sup-

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¹Questions concerning the general accountability and effectiveness of these bodies and the skills and expertise appropriate to their work are examined in a separate unpublished paper: 'Nationalised industry accountability and the consumer interest', 1984.

plementing its other revenues. In this case part of the general burden of taxation is transferred to public enterprise consumers.

2. Lack of market pressure on public enterprises may result in unnecessary costs being passed on in the form of higher prices to consumers and may also adversely affect the efficiency of operations and quality of service offered.
3. The consumers' interest is an imprecise concept. In the case of large capital investments there is a problem of allocation of costs between today's and tomorrow's consumers. There is a parallel difficulty in allocating costs between different types of consumer, e.g. domestic and industrial, and even between different classes of consumer, e.g. rich and poor consumers.
4. Those who manage public enterprises are required to do so in the public interest, but the public interest is an indefinite concept. Actions taken in the public interest are not necessarily in consumers' interests.

There are therefore convincing reasons for consumers to concern themselves with the finances of nationalised industries.

Financial accountability to consumers—recent developments

How does the concern of consumers show itself in practice? The National Consumer Council publication, *Consumers and the nationalised industries* (1976), reviews the arrangements for consumer representation in nationalised industries.² It describes the origin and development of NCCs and their current organisation, functions and relationships with their respective industries. A chapter of 23 pages on policy contains occasional references to the finances of nationalised industries. The references are in the context of pricing policies. For example:

Electricity. Having enumerated the costs of electricity generation and distribution, the report notes, 'Each one of these items raises questions of policy. Is the use of fuel as cheap as it can be for consumers? Are assets being used effectively...etc'.

Gas. 'There is a striking difference between...domestic and industrial tariffs. Domestic consumers in 1974-5 paid on average exactly three times as much for their gas as industrial ones. Moreover the regions with the lowest industrial tariffs mostly have the highest domestic tariffs'.

Later, the National Consumer Council (NCC) took a more detailed look at the financial aspects of nationalised industries in *The Consumer and the State: getting value for money* (1979). This paper diagnosed consumer needs as value for money, choice, information and economic power backed up by effective means of redress. It commented on the lack of choice experienced by consumers of nationalised industry services and concluded that:

since consumers' buying decisions cannot influence the way the industries are run, consumers must somehow be involved in policy-making. The most direct way to achieve this is to have consumers represented on the boards. In addition consumer performance targets as well as financial targets should be set... There has to be systematic collection and assessment of information on how well the services meet consumers' real needs.

It went on to argue for a greater measure of accountability to consumers, with consumers helping to set performance standards and targets. NCCs would monitor the industries' performance against target and would report findings to the public and to Parliament. Again, the treatment of financial issues was slight.

In the same year the Consumers' Association commissioned two investment analysts to examine the accounting policies of eight large nationalised industries (*Nationalised Industries Accounting Policies*, 1979). The aim was to discover to what extent the industries presented a truthful and informative picture of their economic performance through their annual accounts. Amongst the findings were that:

1. The general standard of presentation and content of nationalised industry annual reports was comparable with those of large private sector companies.
2. The number of qualified audit reports in the year chosen for study was much higher than would be expected in a sample of large private sector companies. In one or two cases the audit qualifications concerned questionable accounting practices.
3. Because of the variety of accounting practices amongst the eight corporations, particularly with regard to depreciation, it was not possible to make direct comparisons between the profits of different nationalised industries.
4. Looking at changes in accounting policies in recent years, it was difficult to avoid the conclusion that the more profitable industries had introduced changes to reduce published profits, while the less profitable had sought ways of supporting their profits.

²Specifically, those which had domestic consumers as paying customers.

5. The number of accounting changes in recent years had caused unnecessary confusion.

Thus the general feeling was that the public was entitled to expect a greater degree of comparability between the accounts of nationalised industries than between those of companies in the private sector. The Consumers' Association summed up:

At present it is not possible to compare or judge the financial performance of nationalised industries from their published accounts nor to make any useful assessment of how they perform against the targets laid down for them. The accepted variations in accounting practice enable both profits and losses to be understated and while these variations are allowed it is not surprising that the chairman of the industries use them to present the best possible image of their results. Our report shows that if the accounts are put on a common footing the picture changes significantly. The change is important: it could lead to Parliament taking a different view on vital issues such as capital investment, financial targets, borrowing and pricing policy, as well as on the relative efficiency of the various industries.

Financial accountability in practice

In this section the function played by NICCs as intermediaries in the financial accountability of nationalised industries is investigated, using case studies of three NICCs to discover the way in which they have carried out their role in this area. The three cases chosen for examination were:

<i>NICC</i>	<i>Accountable Industry</i>
Electricity Consultative Council for the South of Scotland (ECCSS)	South of Scotland Electricity Board (SSEB)
London Electricity Consultative Council (LECC)	London Electricity Board (LEB)
Post Office Users' National Council (POUNC)	Post Office (PO) British Telecom (BT)

They were chosen on the basis of accessibility and convenience. Data was assembled via correspondence and as a result of examining published reports. Given the method, the results provide examples of financial monitoring activity, but cannot indicate its comprehensiveness or intensity.

ECCSS

ECCSS has monitored the financial performance of SSEB over a number of years. It discusses financial matters with SSEB on a regular basis, in

particular as a result of the work of the Council's tariff sub-committee which meets quarterly. It has made proposals to the Board which seek to improve the relevance and understandability of SSEB accounts, and has outlined a range of performance indicators acceptable to ECCSS which SSEB has adopted. On the issue of Torness Nuclear Power Station it has drawn the attention of government to the danger of building excess capacity and of consequent failure to achieve the expected economic benefit from the project. It has pressed government to indemnify electricity consumers in Scotland against any resultant losses. It has also supported SSEB in the Board's expressed wish to gain access to commercial loans, which it believes would result in lower electricity prices for today's consumers.

ECCSS has conducted its financial monitoring of SSEB in a low key way, trying to avoid public criticism and challenges, preferring to exert pressure privately and informally on the board. Its trenchant analysis and persuasive representation of consumer needs are claimed to have had a profound impact on SSEB procedures, particularly in the planning phase. Although the impact of ECCSS on SSEB is to a large extent unseen, ECCSS can nevertheless claim that it has had important impacts on SSEB policies in a large number of different fields including connection charges, restriction of level of tariff increases, simplification of tariff structure, simplification and improvement of various aspects of customer accounting and billing, and separation for accounting purposes of hire purchase business from energy business.

LECC

Recently, the financial monitoring of LEB has been apparent in three main areas: representations to extend public accountability; investigations and recommendations concerning LEB's appliance retailing business; and investigations and recommendations concerning suitable performance indicators. On the first issue LECC has argued that public accountability is due by LEB to the people directly or through Parliament and that the LEB's accountability to the Secretary of State for Energy contributes very little to this form of accountability. It sees its own role as that of an intermediary in the accountability process and has argued that access to information is the key to accountability. It finds that its statutory rights to information are narrow. The duty of LEB to inform LECC of 'general plans and arrangements' is an ambiguous one. LECC has pressed for more information from LEB: that it should make available to the public and to LECC its annual corporate plan, capital budget and annual revenue budget; that it should extend its agreement with LECC on the information which LEB should disclose to LECC; and that LEB should report to



consumers once a year on its performance. The LECC has also decided to publish its own annual commentary on LEB's annual report and accounts, arguing that this commentary should accompany the Board's own accounts. Interestingly too, LECC has documented for the years 1979-1982 its principal information difficulties with LEB (several financial items have not been disclosed).

On the second issue, LECC has drawn attention to the large recurring losses incurred by LEB on retailing appliances and the difficulty of understanding and interpreting these losses due to the format of the published Contracting and Sales of Appliances Account. It has pressed for 'accurate trading accounts according to comprehensible accounting principles', for an end to the regime whereby energy consumers subsidise the appliance retail business and for this part of the business to have a statutory target return on capital employed. The subsequent Monopolies Commission report supported the LECC view but did not, according to the LECC, go far enough. In particular LECC accuses the Monopolies Commission of the recital of information and argument emanating directly from the LEB, with little or no substantive analysis and a neglect of the interests of LEB's electricity consumers (as opposed to purchasers of appliances).

On the third issue LECC has been dissatisfied with the performance indicators published by LEB. In particular, criticism is directed at lack of an adequate frame of reference for judging the performance indicators published, because LEB and the other electricity distribution boards present indicators that are only roughly comparable over varying periods and in a manner which obstructs comparison between boards. Another criticism has been the inadequate range of performance indicators. Consequently LECC and LEB have been involved in consultation, which has resulted in agreement to publicise a broader range of indicators, though not all of the indicators requested by LECC. LECC has also drawn attention to areas of LEB activity which on available data appear to be less efficient than those of other boards. LECC has accepted that some of the causes of relative inefficiency are unavoidable but argues that this fact should not obscure the need to reduce inefficiency arising from other causes.

POUNC

Two important developments have recently occurred in the field of financial monitoring. First, in 1980 the Post Office agreed to a series of quarterly meetings between POUNC and senior postal management to review finances and the prospects for prices. A similar agreement was made with British Telecom. It is claimed that these informal meetings have allowed a free and valuable exchange of

information, in particular allowing POUNC to inject a customer viewpoint into many aspects of management thinking, and enhancing POUNC's consideration of tariff proposals. Second, POUNC is in process of establishing a 'customer audit'. This is an attempt to go further than financial targets (for which the Board is responsible to the Secretary of State) into such areas as quality of service, value for money, provision of service and productivity. In the first phase POUNC is seeking to establish an agreed set of yardsticks and measures that will meet the needs of customers, government and Parliament.

In addition, POUNC has monitored costs and prices over a period of years, exerting pressure for their containment. In 1981/82 a proposed postal price increase was deferred for a month following POUNC representations. More recently, POUNC was successful in persuading the Post Office to allow an extended interval between price increases. POUNC has also made representations to government concerning financial targets which appear to work against the interests of customers because they result in excess prices, profits and liquidity. Finally, POUNC has supported British Telecom in its wish to have access to commercial loans on the basis:

that it does not make economic sense for today's customers to finance through the application of higher tariffs an extensive investment programme which will largely benefit customers many years hence.

Two difficulties inherent in POUNC's position in the accountability process were implied in the Council's response to the Department of Trade's consultative document. First, the Council pointed out the difficulty of POUNC achieving tangible results in influencing the industries' policies given the overwhelming position of government in this area. The hope was expressed that the customer audit proposals would supplement the system of financial targets set by government. Second, POUNC argued that in order for progress to be made in influencing the industries' policies, some indication of government expectations would be helpful. Thus POUNC proposed that when it makes representation to government in any matter including pricing proposals, the government should reply in the form of a public comment.

An opinion survey

This section reports the results of a survey of a sample of people active in the consumer movement. It concerns the role of NICCs in monitoring financial performance. We have seen that NICCs have long been active in this field and that recently the Government has enjoined them to

Table 1
Response rate

	N	%
Usable response	113	41
Unusable response	2	1
Non-response	158	58
	273	100

greater efforts. However, it would appear that NICCs are not particularly well equipped to tackle this type of work. In an unpublished study, Yousif (1983) reports an approach to the members of NICCs and to the chairmen and secretaries of NICCs. The objective was to sample their opinions concerning sources of information available to them for the purpose of financial and social monitoring of nationalised industries: the adequacy of the information, and the difficulties inherent in this aspect of the accountability process. While the survey produced interesting responses from the secretaries and chairmen of NICCs, a very poor response was obtained from NICC members. One of the reasons for this appears to be their lack of knowledge of accounting and finance. The same conclusion appears to have been reached by NCC which in recent years has mounted a series of workshops designed to train consumer representatives (mostly from NICCs) in understanding nationalised industries' accounts and finances.

The object of the author's survey was to discover the responses of a group of active members of the consumer movement, many of them reasonably knowledgeable about NICCs, to questions such as:

- Are NICCs equipped with the necessary expertise to monitor nationalised industry financial results?
- If not, how should such expertise be acquired?
- For what aspects of NICCs' work are financial and accounting skills relevant?
- Should NICCs leave financial monitoring to other bodies to whom the nationalised industries are accountable?

Table 2
Age of respondents

Age category	N	%
Twenties	8	7
Thirties	26	23
Forties	22	20
Fifties	29	26
Sixties	22	19
Over seventy	6	5
	113	100

Table 3
Familiarity of respondents with NICCs

	N	%
Non-existent	1	1
Negligible	15	13
Moderate	45	40
Considerable	52	46
	113	100

- Do respondents think that nationalised industries are helpful in the financial information they disclose?

With the permission of the conference organisers, all those attending Consumer Congress 83 were approached by means of a questionnaire. The numbers approached and usable responses were as shown in Table 1.³

The questionnaire contained several demographic measures (sex, whether employed, occupation, and age). Subjects were asked about their familiarity with NICCs and with accountancy and finance. There followed a series of questions on various aspects of the work of NICCs in financial monitoring of nationalised industries.

Results

Demographic details of the respondents were as follows: 52% were male; 59% were in employment, with significant minorities self employed (13%), in part-time employment (16%), retired (13%) and housewives (8%) (in some cases respondents indicated they belonged to more than one of these categories). The age distribution was reasonably even through the thirties to the sixties, as shown in Table 2.

Respondents assessed their own familiarity with NICCs as in Table 3. Their claims appear to have been realistic because 36% of respondents were members of NICC councils and a further 6% were employees of NICCs. They assessed their own knowledge of accounting and finance as in Table 4.

³Questionnaires were distributed in the main conference hall and in the workshop rooms. Respondents were encouraged to complete them before leaving the conference. The vast majority of those responding did so. Response to the questionnaire may have been harmed by the inclusion of a question on political allegiance, the answers to which have been omitted at the request of the organisers. Although anonymity was guaranteed, some argued that the researcher could identify individual respondents by means of other questions (eg sex, occupation, membership of NICCs) and therefore discover individual political allegiances. Some people refused to complete the questionnaire on such grounds.

Table 4
Respondents' familiarity with accounting and finance

	N	%
Non-existent	4	4
Negligible	35	31
Moderate	60	53
Considerable	14	12
	113	100

The first substantive question was how important respondents considered financial expertise and skills to be, in relation to the NICCs' job of monitoring the performance of nationalised industries. Ninety per cent of respondents agreed or strongly agreed with the proposition that NICCs need to have specialist financial expertise at their disposal. Conversely 73% disagreed or strongly disagreed with the proposition that the consumer point of view concerning nationalised industries can be adequately represented without considering the finances and accounts of nationalised industries. They were also given the suggestion that financial skills are relatively unimportant in terms of the NICCs' total activities, and they responded as in Table 5. Thus even on this relative measure, financial skills were still perceived to be important to NICCs.

On the other hand respondents did not feel that NICCs were well equipped with financial skills. As Table 6 shows, only 14% of the total sample agreed with this proposition, with 50% disagreeing and the rest either with no opinion or not responding. One-way analysis of variance revealed a statistically significant relationship between familiarity with NICCs and the answers to this question (significance of $F < 0.02$). Thus the greater a respondent's knowledge of NICCs, the more likely the belief that NICCs are not well equipped with financial expertise.

Table 5
Response to the proposition: 'Financial skills are relatively unimportant in terms of NICCs' total activities'

	N	%
Strongly agree	2	2
Agree	18	16
Neither agree nor disagree	18	16
Disagree	47	41
Strongly disagree	21	19
No response	7	6
	113	100

Table 6
Response to the proposition: 'It is probable that most NICCs are well equipped with financial expertise/skills'

	N	%
Strongly agree	1	1
Agree	15	13
Neither agree nor disagree	23	20
Disagree	46	41
Strongly disagree	10	9
Don't know	15	13
No response	3	3
	113	100

Given that financial skills are important, the next question is: to what aspects of NICC work are they perceived to be important? Respondents were asked to assess the usefulness of financial skills/expertise to various aspects of NICC activity, using categories 'not useful', 'useful', 'very useful' and 'essential'. Table 7 shows that financial skills were perceived by the vast majority of respondents as useful for all these purposes. The greatest usefulness as indicated by the categories 'very useful' or 'essential' were perceived in relation to tariffs, value for money and capital expenditure.

Respondents were asked whether it would be better for NICCs to rely on financial investigation by Parliamentary Select Committees and on the Monopolies and Mergers Commission rather than attempting their own financial evaluations of nationalised industries. Table 8 shows that the response was mixed. The largest group (60%) disagreed with the suggestion, however, and only a minority agreed (20%).

Respondents were also questioned on the way in which NICCs should acquire the necessary financial expertise. Table 9 shows that there was a clear preference for financial skills to be obtained via the members of the councils.

Finally, several questions were put to respondents about the nationalised industries themselves. They were asked about the importance of a nationalised industry's annual report and accounts to consumers. Table 10 shows that 86% of respondents thought it was important. However, they did not find such documents easy to understand, as shown in Table 11. Nor on the whole did they think that the nationalised industries try hard to make their accounts understandable, as shown in Table 12. Indeed, they felt that the accounts were not only difficult to understand but biased to favour the interests of nationalised industries, as Table 13 shows. About 80% of respondents thought this.

Nationalised industries fared little better in re-

Table 7
Usefulness of financial skills/expertise for NICC work

	% replying useful, very useful or essential	% replying very useful or essential	% replying essential
Financial skills/expertise are useful to NICCs in:			
Helping members to understand the annual accounts of the nationalised industry	94	50	20
Giving a better understanding of the industry concerned	92	49	13
Explaining the accounting policies so that the effects on reported figures may be understood	91	52	21
Advising on the merits of tariff proposals made by the industry	90	65	31
Helping to assess the industry's programme of capital expenditure in relation to future consumer needs and technological conditions	90	67	31
Helping to understand the impact of government financial controls on the industry	89	62	26
Proposing methods of assessing financial performance and the value for money provided for consumers	88	67	43

Table 8
**Response to the proposition: 'NICCs should
 rely on other government investigatory
 bodies, rather than attempt their own
 financial evaluations'**

	N	%
Strongly agree	4	4
Agree	18	16
Neither agree nor disagree	17	15
Disagree	50	44
Strongly disagree	18	16
No response	6	5
	113	100

spondents' views of their preparedness to give NICCs information needed to consider tariff proposals or value for money performance. Table 14 deals with this.

To find out whether respondents' answers were influenced by demographic or other factors, one-way analysis of variance was carried out. No statistically significant relationships could be found between the above results and background factors such as sex, employment, political allegiance and age. However, such relationships were apparent when considering respondents' familiarity with accountancy and finance, and with NICCs. It was hardly surprising to discover that those familiar with accounts tended to find nationalised industry accounts relatively easy to understand (significance of $F < 0.001$). Moreover, familiarity with accounts

Table 9
Favoured ways of NICCs acquiring financial expertise

	% agreeing or strongly agreeing
The way for NICCs to obtain financial expertise is via:	
(a) Training courses for council members	61
(b) Recruiting one or two financial experts as council members	71
(c) Employing financial experts as ad hoc consultants	54
(d) Employing financial experts as part of the permanent secretariat	43

Table 10
Response to the proposition: 'The annual report is an important document for those representing the consumer interest'

	N	%
Strongly agree	32	28
Agree	65	58
Neither agree nor disagree	6	5
Disagree	5	4
Strongly disagree	1	1
No response	4	4
	113	100

Table 12
Response to the proposition: 'Nationalised industries try hard to make their accounts easy to understand for the layman'

	N	%
Strongly agree	1	1
Agree	9	8
Neither agree nor disagree	19	17
Disagree	51	45
Strongly disagree	21	19
No response	12	10
	113	100

Table 11
Response to the proposition: 'Nationalised industry accounts are easy to understand'

	N	%
Strongly agree	1	1
Agree	7	6
Neither agree nor disagree	14	12
Disagree	56	50
Strongly disagree	20	18
No response	15	13
	113	100

Table 13
Response to the proposition: 'Whenever allowed to a nationalised industry will choose to disclose financial information favourable to its own interests in its accounts'

	N	%
Strongly agree	39	35
Agree	50	44
Neither agree nor disagree	9	8
Disagree	9	8
Strongly disagree	2	2
No response	4	3
	113	100

Table 14
Response to the proposition: 'Nationalised industries will give NICCs all the information they need in order to consider tariff references or value for money performance'

	N	%
Strongly agree	12	10
Agree	11	10
Neither agree nor disagree	20	18
Disagree	44	39
Strongly disagree	19	17
No response	7	6
	113	100

also influenced the strength of agreement or disagreement with propositions such as:

The annual report and accounts of a nationalised industry is an important document for those representing the consumer interest	<i>significance of F</i> <0.05
The consumer point of view concerning nationalised industries can be adequately represented without considering the finances and accounts of nationalised industries	<0.05

In summary, those familiar with accounts tended to regard them as important for those representing the consumer interest, rejecting the proposition that that interest can be adequately represented without considering nationalised industry finances; they also tended to see accounting knowledge as

important in relation to:

	<i>significance of F</i>
Explaining accounting policies	<0.01
Helping to understand the impact of government controls	<0.001
Proposing methods of assessing financial performance and value for money	<0.005

The influence of respondents' familiarity with NICCs is clearly seen in Table 15. The statistical significance of the relationships was quite high (significance of $F < 0.01$), implying that those familiar with NICCs tend to be more suspicious of the partiality of nationalised industries' financial disclosures than those who are unfamiliar. Moreover, no statistical relationship could be found between this response and familiarity with accounting and finance (significance of $F = 0.8$).

Summary and conclusion

Given the characteristics of nationalised industries and their relationships with government, it is understandable that consumers should be concerned about nationalised industry performance, both financial and otherwise. Recently the consumer movement has evinced considerable interest in these aspects, and individual NICCS have undertaken work of this sort in relation to their respective industries, with varying emphases. The occasion of an annual conference of consumers offered the opportunity to discover the opinions of a sample of those active in the consumer movement, concerning NICCs and their role in monitoring the financial performance of nationalised industries.

Findings revealed that most respondents attached very considerable importance to this aspect

Table 15
Response to the proposition: 'Whenever allowed to, a nationalised industry will choose to disclose financial information favourable to its own interests in its accounts'

	<i>Respondents' answers %</i>		
	Strongly agree/Agree	Other categories	Total
<i>Familiarity with NICCs</i>			
Considerable (n = 52)	88.3	11.7	100.0
Moderate (n = 42)	75.0	25.0	100.0
Negligible (n = 14)	66.7	33.3	100.0

of NICCs' work, but very few indeed believed that NICCs were well equipped to undertake it. Generally, those with the greatest knowledge of NICCs were in greatest disagreement with the suggestion that NICCs are well supplied with the necessary financial skills. On the whole, respondents did not favour the idea that NICCs should rely on other governmental intermediaries in financial evaluations of the nationalised industries. They favoured the necessary skills being acquired by the councils, and the most favoured method of achieving this was via council members themselves (either through more intensive training or by recruiting suitably qualified people as members of NICCs). Only 7% of respondents agreed with the suggestion that nationalised industry accounts are easy to understand, despite the fact that respondents claiming moderate (53%) or considerable (12%) knowledge of accounting represented almost two thirds of the sample. Moreover, only 9% agreed with the suggestion that nationalised industries try hard to make their accounts easy for the laymen to understand. On top of this, very nearly 80% of respondents agreed with the suggestion that, whenever allowed to, nationalised industries would disclose financial information favourable to their own interests, and only 20% agreed that nationalised industries will give NICCs all the information they need for the purpose of tariff negotiation and value for money assessment.

If the actual conditions under which NICCs attempt to monitor the financial performance of nationalised industries approach the conditions envisaged by our respondents in their replies, there

seems little chance of any effective monitoring taking place. The sample was taken from a group of people active in consumer affairs and relatively knowledgeable about NICCs. The more respondents knew about NICCs the less they were likely to consider NICCs to be well equipped in the financial field. Clearly, however, the problems of effective monitoring were not all caused by NICC deficiencies. Some appear to relate to the amount and type of information disclosed by nationalised industries. The evidence of respondents was that the financial information that is given is not properly explained, while information which is necessary for NICCs to carry out their financial work may often be withheld.

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Further sources

Post Office Users'
National Council

London Electricity
Consultative Council

Electricity Consultative
Council for the South
of Scotland

} annual and ad hoc reports of
various dates

Book Reviews

Research Register 1984, R. W. Perks (ed.), special issue of *The British Accounting Review*. The British Accounting Association in association with The Institute of Chartered Accountants in England and Wales, 1984. 238 pp. £5.00 (clothbound).

In addition to being a valuable compilation of current research projects in accounting and finance, this volume possesses historic significance. It is the inaugural publication of The British Accounting Association, which, as from January 1984, is the successor to the Association of University Teachers of Accounting. The old *AUTA Review* will be succeeded by *The British Accounting Review*. For some years, the *AUTA Review* had been supplemented by an annual 'News section', which listed the members of staff in UK universities and polytechnics, their principal research interests, and the titles of their recent research projects. This *Research Register 1984* represents an even more ambitious catalogue of research resources in accounting and finance in the United Kingdom, and it will be useful to teachers, researchers, and professionals in a number of ways.

The compilers of the *Register* have gone to great lengths to cover all UK tertiary institutions that offer substantial accounting courses. It is a pity, however, that several institutions failed to provide any information whatever, and about a dozen neglected to list any specific projects under way. While entries are included for 41 universities, 30 polytechnics, eight other institutions, and four professional accounting bodies, six of the polytechnics failed to provide any information about members of staff and their research activities. (The only tertiary institution for which an entry is not given, as far as I can tell, is the Manchester Business School.) Quite a number of listings, on the other hand, are very extensive, virtually constituting a *curriculum vitae* for some of the staff members. Since the research interests of a considerable number of academics embrace a wide range of subjects and research methods, the disclosure of a broad sampling of research projects for individual staff members is entirely justified. Of particular value is the distinction drawn between the 'lecturing specialism' and 'research interests' of each staff member, as the latter is typically much more varied than the former. An index to research interests is provided so that users of the *Register* can easily identify researchers who have specific interests.

The inclusion of research projects sponsored by

the Institute of Chartered Accountants in England and Wales (which financed the *Register* jointly with The British Accounting Association), the Institute of Cost and Management Accountants, the Association of Certified Accountants, and the Institute of Chartered Accountants of Scotland is an informative addition to the *Register*.

We now have directories of accounting faculty and their teaching and research interests published annually by Prentice-Hall, Inc. (and compiled by James R. Hasselback) for North America, and by the University of Western Australia (compiled by Alan Davison) for Australasia. Neither of these two directories provides the rich detail on faculty research interests, or on research projects completed or in progress, as is found in The British Accounting Association's *Research Register 1984*. The editor and his research assistant are to be congratulated on a job well done.

Rice University

Stephen A. Zeff

Eastern Banking. Essays in the History of the Hongkong and Shanghai Banking Corporation. Frank H. H. King (ed.). The Athlone Press, 1983. xvi + 791 pp. £35.

This weighty but fascinating tome represents the proceedings of a conference on the history of The Hongkong and Shanghai Banking Corporation held in 1981. There are 33 chapters in all plus an appendix on archives.

Of most interest to accountants will be Tom Lee's chapter on the financial statements of the bank, 1865-1980. As Lee points out, only a few such studies have been made. Most have concentrated on disclosure but Lee (to the reviewer's disappointment) pays little attention to this, preferring, even more than in his 1977 paper on Distillers, to concentrate on the reconstruction and interpretation of cash flow statements. This he does with some ingenuity. The results, if not the techniques, will be of interest to banking historians rather than accounting historians. There are no reproductions of the bank's financial statements. The chapter on the note issues of the bank is, however, well illustrated.

Accountants should persuade their banking or economic history colleagues to order this book for the library.

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R. H. Parker

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There is a submission fee of £22 (US\$30) for non-subscribers to *Accounting and Business Research*.

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Accounting Standards Steering Committee (1975), *The Corporate Report* (1975)

Edey, H. C. and B. S. Yamey (eds.) (1974), *Debits, Credits, Finance and Profits* (London: Sweet & Maxwell, 1974)

Lee, T. A. (1983), 'A Note on Users and Uses of Cash Flow Information', *Accounting and Business Research*, Spring 1983.

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Abbreviations should be written as, for example, FASB and not F.A.S.B. Words such as 'realise' should be spelt with an 's' not a 'z'. Single quotation marks should be used, not double.

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